Final Report
On
Conducting Users Satisfaction Study of Improved Water Mill

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Submitted to:

Alternative Energy Promotion Centre (AEPC)
National Rural and Renewable Energy Programme (NRREP)
PO Box: 14364, Khumaltar Height Lalitpur
Phone: +9771-5539390/5536843
Fax: 5539392
Website: www.aepc.gov.np

Submitted by:

Sustainable Energy and Technology Management P. Ltd. (SETM)
Kathmandu, Nepal
Email: info@setmnepal.org
PO Box No: 7039
www.setmnepal.org

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Bibek Kanta Neupane
Programme Coordinator,
Sustainable Energy and Technology Management (SETM) P. Ltd
Kathmandu, Nepal

Abbreviations

AEPC	Alternative Energy Promotion Centre
Avg.	Average
CESC	Community Electrification Sub-Component
CDR	Central Development Region
CRT/N	Centre for Rural Technologies
EDR	Eastern Development Region
ESAP	Energy Sector Assistance Programme
FGD	Focus Group Discussion
FWDR	Far-Western Development Region
GOA	Ghatta Owners' Association
HHs	Households
Hrs.	Hours
IWM	Improved Water Mill
Kg	Kilogram
Km	Kilometer
LPOs	Local Partner's Organizations
Max	Maximum
Min	Minimum
MWDR	Mid-Western Development Region
Nos	Number
NRREP	National Rural and Renewable Energy Program
NRs	Nepalese Rupees
PSU	Primary Sample Unit
QA	Quality Assurance
QC	Quality Control
RETs	Renewable/Rural Energy Technologies
SC	Service Center
SD	Standard Deviation
SETM	Sustainable Energy and Technology Management
SNV	Netherlands Development Organization
TWM	Traditional Water Mill
WDR	Western Development Region

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Executive Summary

This report entitled "Conducting Users Satisfaction Study of Improved Water Mill" has been prepared for National Rural and Renewable Energy Programme (NRREP) under Alternative Energy Promotion Center (AEPC) for systematic assessment of the satisfaction and the level of indulgence related to various prospects of the Users in the Improved Water Mill (IWM). The primary objective of this study was a comprehensive assessment of the impacts of the IWM installed under programme activities so far including aspects like functional/operational status, community benefits and the overall impacts of this rural technology in the livelihood of the beneficiaries both involving the IWM Owner's and the Consumers. Basically this project was set to acquire knowledge on the level of satisfaction with various matters involved in the operation of IWM throughout the country.

This satisfaction survey was chronologically carried out with desk study, questionnaire/checklist preparation for both respondents i.e. owner and the consumers and determination of sample size, field mobilization and data collection/analysis. A consistent and malleable consultation with the NRREP officials, AEPC representatives and related stakeholders was carried out throughout the entire duration of the project to avoid ambiguities and to ensure analogous and comprehensive results. The sample size was determined to facilitate the proportionate inclusion of different types of IWMs as well as to maintain the geographical and regional balance of the scattered IWMs in variety of locations. A calculative sampling approach with necessary statistical equations was applied to determine the sample size out of the total 2509 IWMs spread across the country. 93 samples were selected ensuring the proportionate and precise distribution with respect to the eco-development regions as well as type of IWMs and for this purpose the samples were collected maintaining 1:1 ratio between the user's and the IWM owners. Henceforth, 93 samples each from users and owners were studied. Simple random sampling was implemented to determine samples after the determination of sample size. The eco-development distribution of IWMs were categorized into accessible hills and remote hills of the country.

Key findings: Out of 93 samples, 65 IWMs belonged to accessible hills and remaining 28 IWMs belonged to the remote hills. Altogether 14 IWM, 9 IWMs from accessible hills and 5 IWMs from remote hills were not in operation due to physical damage after flood, abandoned due to disturbance from road side and lack of repairing technologies. Thus, 56 IWMs from accessible hills and 23 IWMs from remote hills were functional at the time of field study. The IWMs non-functional for more than a year were considered as non-operational whereas IWMs with water problems were considered as conditional operational IWMs. There were 19 such conditional IWMs which exhibited seasonal operation due to lack of water and other technical difficulties.

42% of the respondent owners have stated good level of satisfaction with the status of functionality of those IWMs which were operational. The survey revealed that the short shaft IWM was operated for 10 hours per day and long shaft IWM was operated for 9 hours per day on average. The long shaft IWM was found to be operational for 192 days in a year whereas the short shaft IWM was found to be operated for 261 days yearly on average. The long shaft IWM processed about 785 kg of agro food grain per day whereas the short shaft IWM processed 233 kg per day on average. Food grains like maize, wheat, millet and barley were found processed currently in practice

whereas the rice hulling was performed in the long shaft type IWM only. The Owners were enquired about the major problems frequently affecting the IWM and majority (71%) of the responses were received in claiming the problem of stone cutting and bearings. Whereas 57 % of the responses claimed that Takkar and Chakati were the problems in IWM operation. 44 % have reported problems related to canal, 33% have reported to Nozzle and 8 % have reported loss of outputs (ex-Flour). All the surveyed IWMs were subjected to repair and maintenance. The short shaft IWM was repaired 6 times on average in a year whereas the long shaft was repaired for 10 times. The arrangement like managing a local technician, demanding service from installer company or self-repairment were found. 91 % of the respondents claimed the repair was self-carried out. Accessibility to the service enters were assessed and it was found that the maximum time required to reach the service center was 660 minutes (11 hours) in Khotang district whereas the minimal time required was 21 minutes in Kaski district. Regarding the service form Service centers, 66% of the respondent owners agreed with the service center personnel visiting the IWM site with a maximum of 6 visits for short shaft and minimum of 1 visit in a year. Most of the Owners were found satisfied with the after sales service from the service centers.

Socio-economic characteristics owners: The family size of owners were studied and it was found that the average family size in accessible hill was 6 members whereas in remote hill was 7 members. Also the availability of facilities was evaluated and it was found that almost all of the IWM owners had facilities of toilet in accessible hills whereas 96% owners have toilet facilities in remote hills. The overall study revealed that 91% have drinking water facilities, 88% have communication facilities and 59% have Electricity and 64% have facilities of radio and television. The literacy status indicates that 17% of the owners are illiterate and maximum respondents are educated till primary level of grade 1 to 5. Few respondents were found having higher degree of education as well. 66% of the IWM land was found to be private, 10% was found to be rented and 19% was found to be public whereas 5% land belonged to the community. 53% of the respondents claim the source of information of IWM came from local service center whereas 33% came from relatives and the local people. 67% of the respondents have said the decision to install the IWM at household was made by the head of the household male member. 80% of the owners were found having additional sources of income except IWM such as agriculture, local business, shops, teaching and nursery enterprise. 77% of the owners have said the management of own investment was from family savings and 10% from remittance and property selling's.

Socio-economic characteristics User's: As discussed in owners, the family size of user household was assessed and it was found that the overall average family size was 6 members in both ecological regions. There were 10 female household heads in accessible hill and 2 in remote hill. The average age of household head was found to be 48 years. There were total of 79 male school going children and 70 female school going children. Likewise, in owners, the availability of facilities at consumer households was also assessed and the study shows that 92% of users have facilities of toilet, 87% of the users have drinking water and communication facilities, 69% have electricity and 62% have radio/television facilities at their households.
The literacy status of users indicates that 10% of the users are illiterate and majority of the users are educated till primary level. The main occupation of the users was found to be agriculture (89%) whereas business, government service and teaching were also some of the occupation found in the study. Regarding the food sufficiency in user household, 63% of the users have food enough for

6-12 months whereas 30% had enough for 3-6 months. The average land owned by the users was found to be 9 Ropani whereas the annual income of the users was found to be NRs 67,125 and the annual expense was NRs 54,830. The average distance to the IWM site from user household was found to be 1.7 km.

Impacts and benefits of IWM: The owners state that the family support is excellent for IWM operation and almost all of the members present in a particular family have supported the use of IWM. 58% of the respondent owners have said an increase in profit after IWM operation in their livelihood. It was found that the users belonging from different caste compositions like Brahmin, Chhetri, Janajatis and Dalits were benefitted from the IWM operation. It was revealed that the farthest customer took average 75 minutes to reach the particular IWM site of their region. This indicates wide spread of the IWM coverage. On average it was found that about 5 customers in short shaft and 10 customers in long shaft visited IWM daily for processing. Mostly among the customers, the frequency of adult female was seen higher than adult male and children. The data showed that very few children are involved in visiting IWM for processing. IWM has created employment opportunities in the local level, 79 self-employments and 12 additional employments were found in the time of field survey. Comparing the scenario of previously used traditional water mill (TWM) and current improved water mill(IWM), it can be said that there has been significant amount of increase in processing of food crops such as Maize, Wheat, Millet and Rice. For example, previously 14 kg of maize was processed in an hour in TWM but presently in IWM 24kg of maize is processed in an hour Same significant increase can be seen in other crops as well. Hence the major benefits of the IWM from user's perspective can be summarized into: Agricultural works carried out in leisure, fast processing due to advance technology, easy for operation, low processing cost and good quality of taste and end products from IWM.

Overall Satisfaction with IWM technology: Most of the users and owners are satisfies with the IWM technology and operation benefits of IWM. The owners have provided high satisfaction level with the quality of technical services, technical backstopping after installation, frequency of maintenance, cost of maintenance and availability of spare parts. Majority of the users are highly satisfied with the services and performances of AEPC/NRREP. Majority of users agree that IWM has bought happiness and in reasonable for the poor people as well. Most of the users have very high satisfaction with the technology in rural areas. About 83% of the users have claimed reduction in drudgery for all members in the family after IWM operation. This indicates very positive aspect in the reducing human effort and making IWM technology popular. 86% of the users have stated increased agricultural productivity after IWM installation. 94% of the users have said that IWM has saved time for agro processing. The saved time is utilized by the users by performing various kinds of activities like agricultural works, household activities, income generating activities and spend time in study. 52% of the users have said that IWM is cheaper compared to the other technologies while 45% have said same tariff structure compared to others. 63% of the respondents felt the charge of IWM processing is fair while 37% believe that the charge is reasonable.

34% of the users have stated that the quality of end products from IWM after processing is excellent and remaining users have good satisfaction level. 92% of the users have stated that IWM has indeed helped in income generation activities because of reasons such as availability of resources, saving of time and low processing costs. 67% of the overall users have good satisfaction

level with the IWM technology. 96% of the overall users are satisfied with their respective IWM owners.

Conclusion and recommendations: Thus, summarizing all the finding and the results drawn from this assignment study, it can be said that IWM has provided satisfaction to the users and the owners. IWM has saved time, saved resources and helped in reducing human effort and hard labor. The quality of the end products from IWM processing was also favored by majority of the users and their support for IWM operation is high. This indicates that the IWM operation is highly feasible in terms of renewable energy and alternative energy in coming future. The users are satisfied and hence it can be easy to expand this technology with more upgrades and advancements.

The study team would like to recommend trainings regarding the repair and maintenance of the IWM to the owners and operatives so that the repairing can be done at local level without having to shut down the IWM for specific time. Initiation and conducting of awareness programs advocating the benefits of IWM to the users and income generation strategy to owners can be of great step in near future. IWM is an environment friendly technology and the promotion of IWM in various regions for alternative energy and utilization of resources properly is a must needed implementation.

1. Introductions

1.1. Background

Nepalese society is primarily agrarian. Hydropower is widely available in this mountainous terrain, and water-powered mills are commonly used in rural areas for agro-processing. Agro-processing is one of the important activities for rural communities in Nepal. In rural areas of Nepal, majority of population have been using traditional mills with low efficiency for agro-processing. Traditional mills are made from local materials; so naturally, each to some extent is unique. In Nepal, rural communities depend, to a large extent, on these traditional mills for their daily life. Improvement of the existing traditional water mills is one of the most efficient and reliable options for rural/remote areas of Nepal to improve quality of rural livelihood. In this regard, these water mills are commonly called appropriate technology with its improved performances and reliability.

Improved Water Mills (IWM) are appropriate and reliable rural technology; it has been used in rural areas for the agro-processing. Traditional water mill (TWM) has low processing capacity and delayed time as compared with improved water mill. IWM has become more popular because of its higher processing capacity and better quality product for agro-processing. The technology has also helped to bring positive changes in the socio-economic conditions of the owner's family and their customers of surrounding areas.

Improved Water Mill (IWM) Programme, initiated since 2003, was executed by Alternative Energy Promotion Centre (AEPC) and implemented by CRT/N. Netherland Development Organization Nepal (SNV/N) provided financial support for the programme from 2003 till 2010 and since January 2011, Energy Sector Assistance Programme (ESAP) was providing the financial support. Around 813 IWMs were installed with the effort of the programme considering ESAP Phase I and Phase II activities. Now, the dissemination of IWM is being done by NRREP. In recognition of the high impact potential (both energy access and social benefit) for the poor, rural and remote population in Nepal, IWM features as a priority technology in the Government of Nepal's policies, plans and programmes.

The Community Electrification Sub-Component (CESC) of NRREP is one of the major sub-components responsible for coordination and implementation of community electrification activities throughout the country in demand driven and public-private-partnership approach.

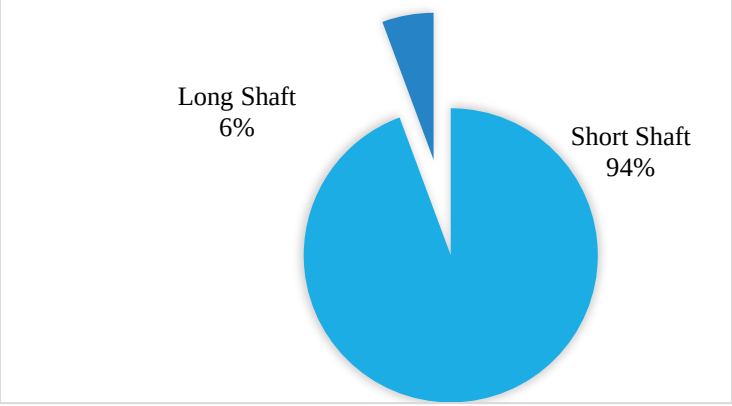


Figure 1: Installation of IWM system during NRREP period

Within the NRREP period, 2,509 IWM have been installed, which includes 2,367 short shaft and 142 long shaft. These projects are scattered across the country and provided a basis of conducting the study. The following table shows the distribution of IWM projects:

Table 1:Eco-Region wise Installation of IWM during NRREP period

Ecological Belt	IWM Numbers	Short-Shaft	Long-Shaft
Accessible Hill	108	102	6
Remote Hill	10	10	
Accessible Hill	435	408	27
Remote Hill	373	358	15
Accessible Hill	545	538	7
Remote Hill	326	321	5
Accessible Hill	125	107	18
Remote Hill	49	47	2
Accessible Hill	538	476	62
Total	**2509**	**2367**	**142**

Source: AEPC/NRREP, 2017

As per clause No. 14 (b) of Annex I of Renewable Energy Subsidy Delivery Mechanism, 2073, "the AEPC shall do the evaluation of impact of the project and users' satisfaction in every two years through the independent consultant". During NRREP period, such studies have not been carried out. In this context, it is necessary to conduct a study for comprehensive assessment of the impacts of the IWM installed under the programme activities so far, on functional/operational status, community benefits, etc. in the Accessible Hill and High Hill regions of the country in order to assess the community benefits associated with the installation of IWM.

1.2. Objectives

The objective of the assignment was to assess the Users' Satisfaction Study of IWM and the impacts of the IWM installed under programme activities so far, on functional/operation status, community benefits etc. More specifically the following objectives need to be addressed by the study.

- Assessment of socio-economic characteristics of IWM users and owners
- Operation and maintenance of IWM
- Assessment of time saving (grinding, milling and other end use time before and after) and utilization of saved time
- Assessment of reduction in drudgery of women and children for agro-processing
- Assessment of employment creation and/or the business/end-use diversification
- Assessment of types and quantity of agro products processed by IWM
- Assessment of overall beneficiary satisfaction with the product and process

1.3. Rationale of Study

The rationale behind conducting this study was to assess the operational and functional status of the installed IWM in the Hill and High Hill regions of the country in order to assess the community benefits associated with the installation of IWM.

1.4. Scope of Work

The scope of work included the following:

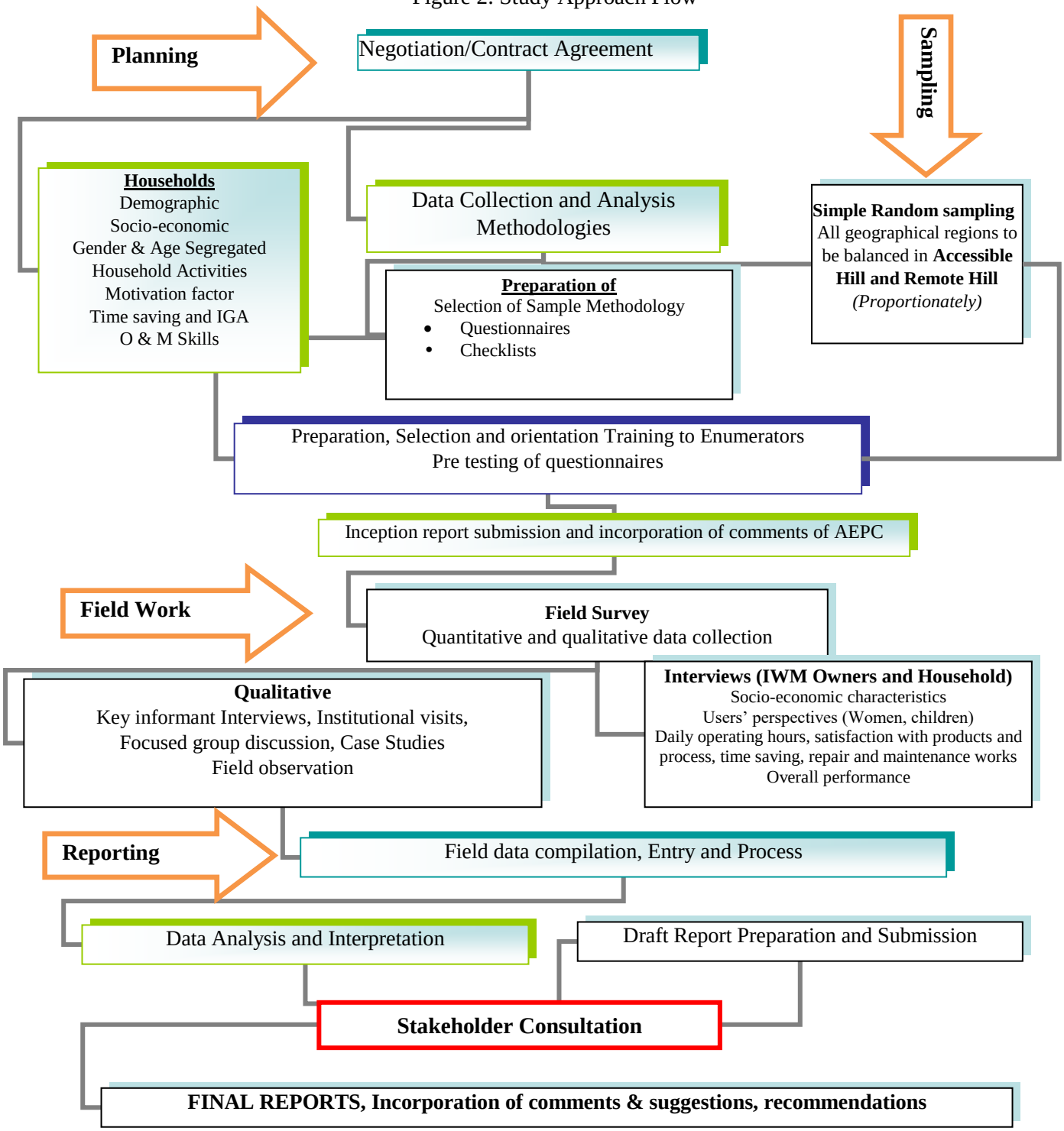
- Review relevant documents, program, policies, etc. on IWM as well as current trends of the technology
- Finalize methodology, questionnaires and details of the study and discuss with relevant AEPC staff
- Prepared Inception Report incorporating all suggestions from AEPC
- Conducted orientation program to familiarize the enumerators with the IWM Users' Satisfaction Survey
- Carried out the field data collection as per the calculated samples
- Tabulation and data analysis from the survey
- Produced the draft report and submitted to AEPC/NRREP/CESC
- Prepare final report after incorporating inputs from the AEPC/CESC

2. Methodology and Work Plan

2.1. Study Approach

The study approach has been prepared based on four main components: planning (mobilization), field work, analysis and reporting. The approach has been thoroughly presented in the following figure.

Figure 2: Study Approach Flow



2.2. Methodology

The following methodologies were applied during various stages of the study.

2.2.1 Desk Study

Desk study and interaction sessions were carried out to get valuable information related to IWM technologies, technology options and benefits. The relevant stakeholders as Alternative Energy Promotion Center (AEPC), CRT/Nepal, and others were consulted on the project, its implementation issues and other specific issues like after-sales services, repair and maintenance, factors affecting the satisfaction of the users, etc. that was helpful in detail planning of this particular study including the preparation of both owner and user survey questionnaires.

2.2.2 Survey Design and Implementation

Based on the review of survey plans, the Consultant team has developed information collection formats such as structured questionnaire and observation sheets required for conducting the survey. The questionnaire administered during previous surveys were taken as reference for the proposed study. Nonetheless, the content of questionnaire is tied up with the survey requirements and objectives of the study.

The sample were taken from the IWM disseminated under AEPC/NRREP. The survey was conducted with the objective to assess the operational status of IWM, daily operating hours, community benefits and their impacts. SETM prepared a detailed randomly selected, statistically representative, list of IWMs from the IWM disseminated during NRREP period. In course of sample selection, special care has been taken to:

- Include different types of IWM proportionately
- Maintain geographical and development region balance

2.2.2.1 Objective and reliability

The survey was implemented with the objective to assess the operational status of IWM and daily operation hours of IWM with a desired 90/10 confidence/precision.

2.2.2.2 Target Population

The target population for the survey was 2,509 IWM owners spread across Nepal (Accessible Hill and Remote Hill).

2.2.2.3 Sampling Method

The required sample size that represents the population of IWM under AEPC/NRREP was calculated first. Then the sample size was allocated to Accessible Hill and Remote Hill on a proportionate basis looking at the distribution of the total IWM in these two regions. Furthermore, the sample size in each region was allocated to different types of IWM on proportionate basis. The final sample size determined for the survey purpose was allocated to each type and each particular region on a proportionate basis according to the distribution of total population. For this survey purpose, initially the database of total population under AEPC/NRREP and types was collected. As mentioned above method; simple random sampling was applied for the selection of samples after determining the required sample size.

2.2.2.4 Determination of Sample Size

The sampling was performed within the level of precision of 10% and a confidence level of 90%. The sample size was determined by using the following formula

$$n = \frac{N \times p(1-p)}{(N-1)\frac{d^2}{z^2_{\alpha/2}} + pq}$$

Where:
n = desired sample size i.e. IWM sites for the survey
$z_{\alpha/2}$ = value for the standard normal distribution value, with an infinite number of readings, and for the desired confidence level. For confidence level of 95%, α is 0.05 and the critical value is 1.96)
p= proportion in the target population estimated to have a particular characteristic
N= 2509 (total number of IWM installed)
d = degree of accuracy desired or error in estimation level i.e. difference between estimated and true value usually set at 10%.
Since, variance of the variables or indicators under study is not known. The value of p is set at 50% i.e. 0.5 so q= 0.5. Hence the required sample size was calculated by the equation below;

$$n = \frac{2509 \times 0.5(1-0.5)}{(2509-1)\frac{0.1^2}{1.96^2_{0.05/2}} + 0.5 * 0.5}$$

n = 93
The calculated sample size was 93. Thus, the total required sample size was 93.

2.2.2.5 Allocation of Sample Size

A. Allocation to Accessible Hill and Remote Hill

Table 2 shows the allocation of the samples according to the ecological belts namely accessible Hill and Remote Hill. There were 1751 IWMs installed in accessible Hill representing 69.79 percent of the total installed while 758 were installed in Remote Hill representing 30.21 percent of the total installations. The samples were drawn proportionately from these two ecological belts. While doing so 65 samples were taken from Accessible Hill and 28 from Remote Hill.

Table 2: Proportion of IWMs installed during NRREP period and sample size in different eco-belts

Ecological Belts	Installed IWMs		Sample Number	
	Number	*Percent*	*Number*	*Percent*
Accessible Hill[1]	1751	69.79	65	69.79
Remote Hill	758	30.21	28	30.21
Total	**2509**	**100.00**	**93**	**100.00**

Source: AEPC/NRREP/CESC database

B. Allocation to Different Strata

The samples drawn by ecological belts were disaggregated by stratum, which is defined as IWM installations in each development region for each ecological belt. Table 3 shows the representation of samples in different strata. While doing so proportionate representation in each stratum was ensured. For example, far-western accessible hill has the highest percentage of IWM installation (21.72%) so highest numbers of samples, 20 were taken from this stratum.

[1] The district Kailali lies in the Terai Region however this is also included in accessible hill.

Table 3: Allocation of Samples by stratum

Eco Belt	IWM Installed		Sample	
	Number	*Percent*	*Number*	*Percent*
Accessible Hill	108	4.30	4	4.30
Remote Hill	10	0.40	0	0.40
Accessible Hill	435	17.34	16	17.34
Remote Hill	373	14.87	14	14.87
Accessible Hill	545	21.72	20	21.72
Remote Hill	326	12.99	12	12.99
Accessible Hill	125	4.98	5	4.98
Remote Hill	49	1.95	2	1.95
Accessible Hill	538	21.44	20	21.44
Total	**2509**	**100.00**	**93**	**100.00**

C. Primary Sample Unit (PSU) Selection

To determine PSU in each stratum, firstly each district was identified as the eligible PSU. In order to increase the efficiency only districts having installed IWMs equal to or beyond the sample size required for the stratum are eligible. For example, the required sample size for the eastern accessible hill is 5, hence Dhankuta and Panchthar were left out which have less IWM installed than the required sample size.

In the next step, a random number was generated in MS Excel by using the **"randbetween"** function and districts in each stratum were selected as our sample PSUs. Table 4 gives the detail of the selected PSUs and the required sample size in each PSU.

Table 4: IWM Installation by Districts, required sample size and selected PSU

Districts	Installed IWM	Required Sample Size	Selected PSU
Eastern Remote Hill	**49**	**2**	**Khotang**
Khotang	13		
Sankhuwasabha	5		
Solukhumbu	31		
Eastern Accessible Hill	**125**	**5**	**Okhaldhunga**
Dhankuta	3		
Ilam	11		
Okhaldhunga	98		
Panchthar	1		
Udayapur	12		
Central Accessible Hill	**538**	**20**	**Nuwakot**
Dhading	29		
Dolakha	43		
Kavrepalanchok	25		
Makwanpur	82		
Nuwakot	86		
Ramechhap	9		
Rasuwa	79		
Sindhuli	76		

Sindupalchowk	109		
Western Remote Hill	**10**	**-**	
Manang	5		
Mustang	5		
Western Accessible Hill	**108**	**4**	**Kaski**
Baglung	3		
Gorkha	26		
Kaski	55		
Lamjung	12		
Myagdi	5		
Palpa	1		
Parbat	5		
Syangja	1		
Mid-Western Remote Hill	**373**	**14**	**Jajarkot**
Dolpa	28		
Humla	6		
Jajarkot	177		
Jumla	18		
Kalikot	144		
Mid-Western Accessible Hill	**435**	**16**	**Salyan**
Dailekh	83		
Rolpa	92		
Rukum	104		
Salyan	116		
Surkhet	40		
Far-Western Remote Hill	**326**	**12**	**Darchula**
Bajhang	115		
Bajura	61		
Darchula	150		
Far-Western Accessible Hill	**545**	**20**	**Baitadi**
Achham	92		
Baitadi	164		
Dadeldhura	39		
Doti	141		
Kailali	109		
Total	**2509**	**93**	

D. IWM Selection

To determine the sample IWMs, simple random sampling method was applied. Firstly, the PSU was determined then a random number generated. By sorting random number from lowest to highest, the required samples in each stratum was listed. SETM consultant team has used a "Rand ()" function in MS Excel to find a random number. Details of all selected IWM project has been provided in **Annex 2.**

Table 5: Allocation by Type of IWM

Ecological Belts	Installed IWMs		Sample Number	
	Number	*Percent*	*Number*	*Percent*
Long Shaft	142	5.66	5	5.66
Short Shaft	2367	94.34	88	94.34
Total	**2509**	**100.00**	**93**	**100.00**

E. Household Selection

A total of 93 beneficiaries were selected for user satisfaction survey maintaining 1:1 ratio of sampled IWM to households. The nearest household of IWM site was selected as sampled beneficiary household.

Table 6: Selection of IWM Users(HHs)

Districts	Province No:	Eco Belt	Sampled IWM Number	Number of HHs to be surveyed
Baitadi	7	Accessible Hill	20	20
Darchula	7	Remote Hill	12	12
Jajarkot	6	Remote Hill	14	14
Kaski	4	Accessible Hill	4	4
Khotang	1	Remote Hill	2	2
Nuwakot	3	Accessible Hill	20	20
Okhaldhunga	1	Accessible Hill	5	5
Salyan	6	Accessible Hill	16	16
	Total		**93**	**93**

2.2.3 Survey Locations

The sample districts are dispersed in the Remote Hill and Accessible Hill regions of Nepal. This survey covered 8 districts of which 5 districts Okhaldhunga, Nuwakot, Kaski, Salyan and Baitadi were from Accessible Hill whereas remaining 3 districts namely Khotang, Jajarkot and Darchula were from Remote Hill region of the country.

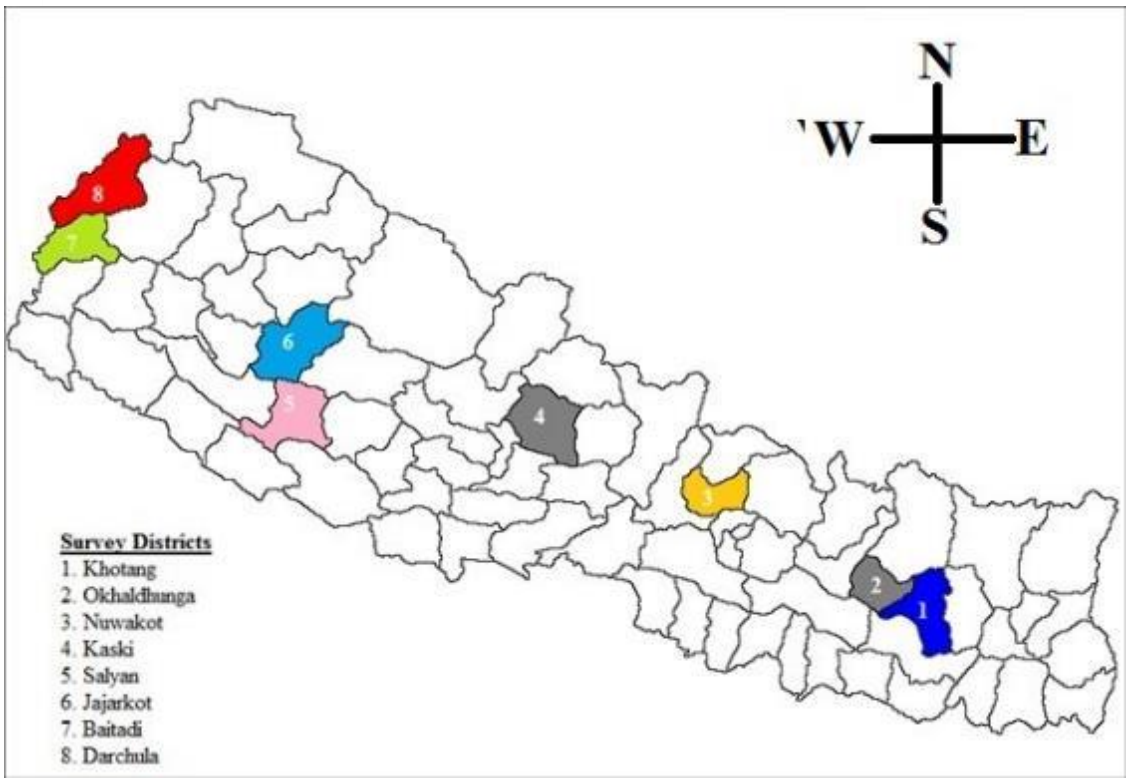


Figure 3: Map showing the survey districts

2.2.4 Data Collection

Data collection process entailed the activities like selection and orientation of the enumerators, pre-testing of questionnaires and field work. Subsequent to these, the data gathered from the field was analyzed. The following section offers information on the various stages of data collection and analysis.

2.2.4.1 Questionnaire preparation

Based on the study objectives, the questionnaire was prepared. It mainly focused on the functional status of IWM technology disseminated whole over the country. In addition to that, the factors in direct relation to IWM users and operator benefits were of prime concern. The socio-economic characteristics of both IWM owners and users, repair and maintenance of IWM technology, time saving, gender benefits, employment opportunities and overall satisfaction of users were assessed through structured questionnaires.

2.2.4.2 Selection and Orientation of Enumerators

Field enumerators were mobilized for the survey purpose assessing them on the basis of their qualifications and experiences in similar kinds of studies in the past. Three days' orientation program was conducted in Kathmandu to familiarize the enumerators with the questionnaires, survey methods and procedures.

2.2.4.3 Pre-testing of the Questionnaire

At the beginning, a joint team including the team leader carried out the field test of survey instruments (questionnaires, checklist) at Kavre district. The prepared questionnaire was pre-tested for complete understanding of the survey questionnaires and identifying foreseeable problems that

may occur during field visit. A field visit to IWM site at Panauti of Kavrepalanchok was conducted. The final questionnaire administered for field survey is attached in **Annex 1** of this report.

2.2.4.4 Field Survey

Following the acceptance of the survey questionnaires by AEPC/NRREP/CESC, an extensive field visit was carried out in the sample IWM sites. Any discrepancies noted during the survey were reviewed at the end of the day to avoid inclusion of erroneous information while compiling the data. Interaction with intermediaries, partner organizations and related agencies such as local partner's organization (LPOs), Ghatta Owner Association (GOA), Kit manufacturers also conducted to familiarize with activities undertaken and supported by those agencies. It helped to gather data on:

- Functional status of installed IWMs
- Users' perception
- Trends and future prospects

2.2.5 Data Analysis

After completion of field survey, the collected information and data were recorded systematically in a database. The data obtained from the field work was reviewed to avoid problems of duplications and ambiguities. All the quantitative data collected from the field was encoded and analyzed by using statistical tools.

2.2.5.1 Statistical Analysis

Surveyed data were grouped into different categories by types (long shaft and short shaft) and geographical terrain (Accessible Hill and Remote Hill). Appropriate statistical analysis was carried out to observe the results with arithmetic mean and standard deviation (SD) separately for each category wherever appropriate. Subsequent chapters present the findings from the statistical analysis.

2.2.6 Quality Assurance/Quality Control (QA/QC)

Efforts were made to ensure quality of the data collected from the field. QA/QC measures were adopted to attain the desired 90% confidence level for the parameters under consideration. Similarly, a thorough check of the questionnaires filled up by the enumerators was done during data analysis and any discrepancies was sorted out and corrected immediately.

2.2.7 Reporting

Progress reporting was done at different stages of the study.

2.2.7.1 Inception Report

Before proceeding to the fieldwork, the study team submitted an Inception Report containing sample selection, site allocation, and tentative format of ToC of the draft report. The field enumerators for the survey were also fixed and detail work plan/timeline was prepared.

2.2.7.2 Draft Report

Based on the data obtained from the fieldwork and study, a draft report along with all of the findings was prepared and submitted to AEPC/NRREP/CESC within the given time schedule. The comments/feedback received from the relevant stakeholders were then received and all the comments and suggestions are addressed and incorporated in this final report.

2.2.7.3 Final Report

Based on the feedbacks received from AEPC/NRREP/CESC, this final report has been prepared in an adhering to strict quality standards. As per the discussion held during the consultation, comments and suggestions are incorporated in the final report while improving the consistency.

3. Overall Findings from the Study

3.1. Functional Status of IWM

The study was carried out in altogether 8 districts and total of 93 samples each of IWM owner and user were surveyed from these districts situated in accessible hills and remote hills of Nepal. There were a total of 88 short shafts and 5 long shafts. 65 IWMs were surveyed in accessible hills covering districts Nuwakot, Okhaldhunga, Salyan, Kaski and Baitadi whereas 28 were surveyed from remote hills comprising districts Jajarkot, Darchula and Khotang. All of the 5 long shafts IWM belonged to accessible hills.

Among the 65 IWMs from Accessible hills, 56 were operational at the time of field survey whereas remaining 9 IWMs were not in operation. Similarly, among 28 IWMs from remote hills, 23 were operational and 5 were non-operational. The reasons behind non functionality include physical damage after flood, abandoned due to disturbance from road side and lack of repairing technologies. The IWMs non-functional for more than a year were considered as non-operational whereas IWMs with water problems were considered as functional. Altogether 14 IWMs from both regions were not functional in which there were 7 short shafts and 2 long shafts from accessible hills and 5 short shafts from remote hill.

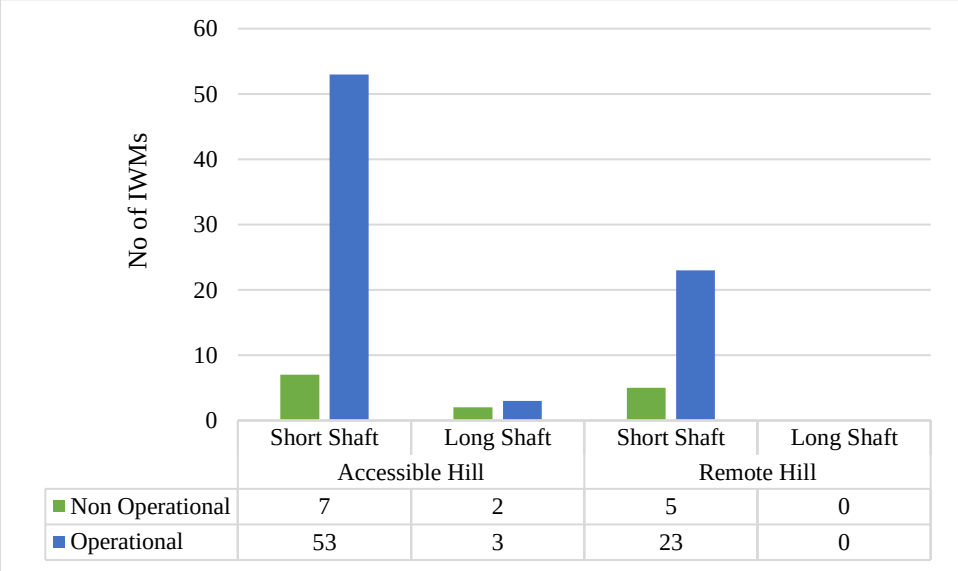


Figure 4: Functional Status of IWM

On basis of geographical regions, the functional IWMs were surveyed for the status of their satisfaction level and it was found that overall 24% owners have excellent level of satisfaction with functionality of their IWM. 42% of the respondent owners have good satisfaction level whereas 10% are satisfied. 24% of them have stated poor satisfaction level with the functional status of IWM. The poor satisfaction level denotes the conditional operational of IWM and has no smooth running and has encountered many repairs and maintenance since its installation. Excellent and good level indicate no major repairs and no problems encountered in the IWM often.

Table 7: Status of Functional IWM on Basis of Regions

Status of Operational IWM	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Excellent	16	28.57	3	13.04	19	24.05
Good	21	37.50	12	52.17	33	41.77
Satisfactory	4	7.14	4	17.39	8	10.13
Poor	15	26.79	4	17.39	19	24.05
Total	**56**	**100**	**23**	**100**	**79**	**100**

Source: Field Survey, SETM 2017

Similarly, on basis of type, the functional satisfaction was assessed and it was found that 24% respondent owners had excellent satisfaction level, 42% had good and 9% had satisfactory level of concern. 25% off the short shaft owners had poor satisfaction level. Similarly, the long shaft respondents have 33% excellent satisfaction level.

Table 8: Status of Functional IWM on Basis of Type

Level	Long Shaft		Short Shaft		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Excellent	1	33.33	18	23.68	19	24.05
Good	1	33.33	32	42.11	33	41.77
Satisfactory	1	33.33	7	9.21	8	10.13
Poor	0	0.00	19	25.00	19	24.05
Total	**3**	**100**	**76**	**100**	**79**	**100**

Source: Field Survey, SETM 2017

3.2. Conditional operation of surveyed IWMs

The IWMs having poor satisfaction level with the operation as mentioned earlier are classified as having conditional operation status. 19 out of 79 IWMs are conditional in operation in which 15 are from accessible hill and 4 from remote hill. All the 19 conditional IWMs are short shaft type. The 19 conditional IWMs are further classified into two categories, IWMs having technical difficulty and IWMs with water problems.

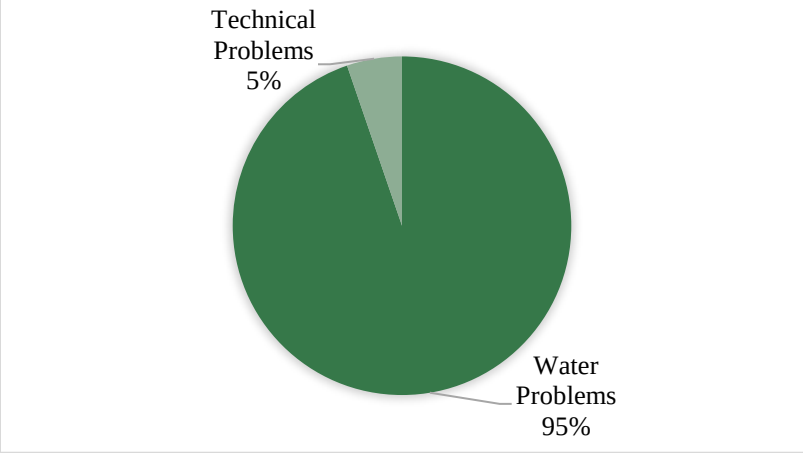


Figure 5: Conditional Operation of IWM

Amongst the 19 conditional IWMs, 95% of them are associated with water problems and can be termed as seasonal in operation because those IWMs operate only when there is availability of water or in monsoon season when there is adequate rainfall. Whereas 5% are associated with technical difficulty like problems in *kulo* or *jatho.*

3.3. Details of Non-functional IWMs

During the field survey, altogether 14 IWMs were found non-functional. Out of 14, 4 IWMs from Darchula, 3 IWMs each from Salyan and Okhaldhunga and 1 IWM each in Baitadi, Jajarkot, Kaski and Nuwakot were found not in operation. Amongst these 14 IWMs, 2 were long-shaft whereas remaining 12 were short-shaft type. The following table depicts the reasons of non-functional of the respective IWMs.

Table 9: List of Non-functional IWMs at the Time of Field Survey

District	Name of IWM Owner	Reasons
Nuwakot	Sanja Tamang	No Canal and shortage of water, technical problems.
Jajarkot	Narendra B. Khattrai	IWM damaged by flood
Okhaldhunga	Dirki Bishwokarma	IWM not installed currently however they already constructed grinder, IWM-shed, canal etc. As said, the installer company visited many times but few equipment is still required.
	Shanti Raj Rai	IWM not installed currently though equipment is already present. Owner said unavailability of grinder stone at local level is delaying installation.
	Bishnu Lal Giri	IWM damaged by flood and road construction above IWM site
Salyan	Bimi Buddha Magar	IWM damaged by flood
	Nakche Pun	IWM damaged by flood
	Budda Jung Shah	IWM damaged by flood
Darchula	Dan Sing Dhami	Physical damage due to road construction
	Harka B. Saud	IWM damaged by flood
	Chandra Sing Dhami	Physically damaged
	Hari Dev Dhami	IWM damaged by flood
Baitadi	Karbir Bista	Physically damaged
Kaski	Aitalal Sarki	Water problems and technical problems.

Source: Field Survey, SETM 2017

3.4. Daily Operating Hours

The daily operation hours denote the average time (hours) in a day the IWM operates. Table 10 below illustrates the operational time of both types of IWM in a day. The average hours of short shaft operated was 10.78 hours in a day whereas long shaft was 9.16 hours per day.

Table 10:Average Operational time (hrs./day)

Type	Mean	S.D.
Short Shaft	10.78	6.15
Long Shaft	9.16	6.73

Source: Field Survey, SETM 2017

Also, the average operational days per year was assessed on basis of both the type of IWM and respective region. It was found that the IWMs in accessible hill operate 260 days on average per year whereas in remote hill operate 263 days per year on average. On basis on type, the short shaft IWM operates 261 days per year in average whereas the long shaft operates 192 days on average per year.

Table 11:Average Operational Days (per year)

Type of IWM	Accessible Hill		Remote Hill		Total	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Short Shaft	263.8	71.32	255.61	70.05	261.13	71.32
Long Shaft	192	59.58	-	-	192	59.58
Total	**259.89**	**71.32**	**263.29**	**70.05**	**261**	**71.32**

Source: Field Survey, SETM 2017

3.5. Agro-Processing Capacity

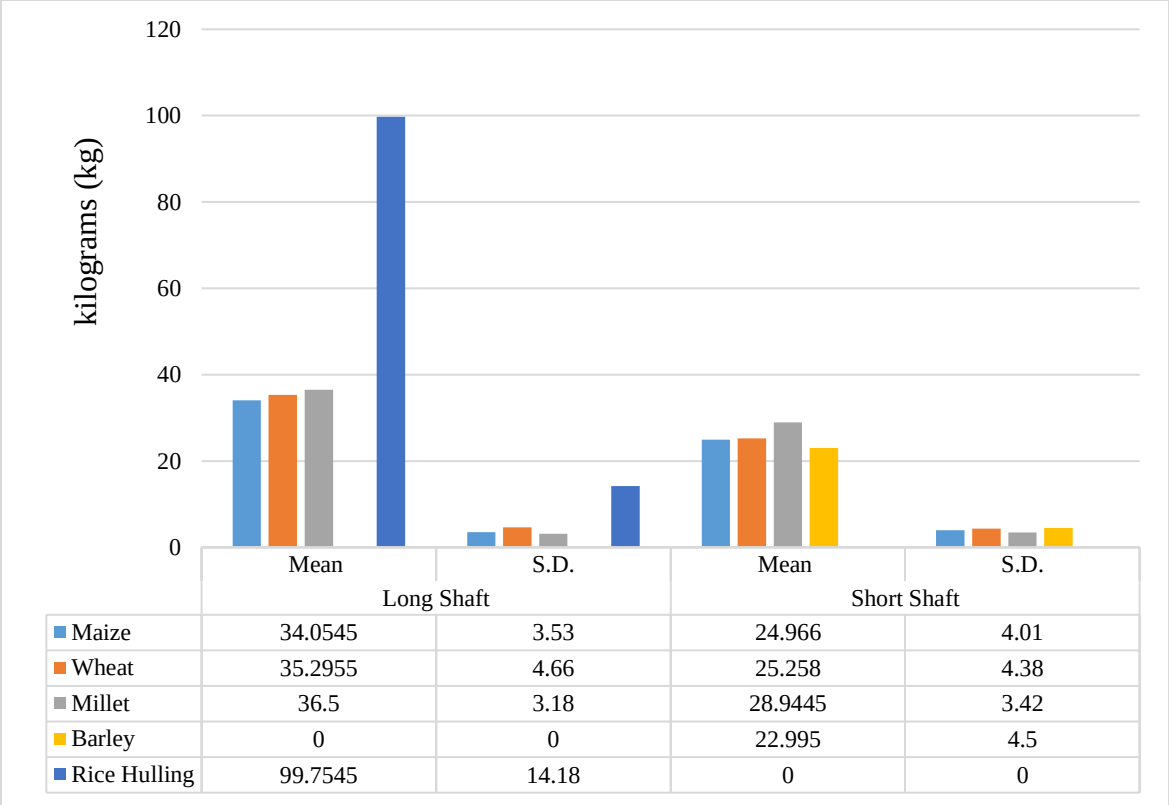
Agro-processing capacity of IWM denotes the average amount of agro food grain processed in a certain length of time. The quantity of agro food grain processed by the particular IWM indicates its capacity. Table below shows the daily food processing capacity of short and long shaft IWM. On average about 254.73 kg of food grain is processed in a day altogether from both type of IWM. While individually it can be seen that long shaft IWM processes about 785 kg of food grain per day and short shaft IWM processes about 234 kg of food grain per day.

Table 12: Average Quantity of food grain processed per day, kg

Type of IWM	Mean	S.D.
Long Shaft	785.334	70.27
Short Shaft	233.7825	42.65
Total	**254.7335**	**59.57**

Source: Field Survey, SETM 2017

Figure below shows the amount of different types of food grain processed by the IWM in one hour. The various food grains can be classified as Maize, Wheat, Millet and Barley. The rice hulling facility is available only in the long shaft IWM. Hence it was found that on average the long shaft processes 34 kg of Maize, 35 kg of Wheat, 36.5 kg of Millet. On the other hand, the short shaft processes 25kgs of Maize, 25 kg of Wheat, 29 kg of Millet and 23 kg of Barley per hour. As the rice hulling is processed in long shaft, it processes up to 100 kg in an hour.



	Long Shaft		Short Shaft	
	Mean	S.D.	Mean	S.D.
Maize	34.0545	3.53	24.966	4.01
Wheat	35.2955	4.66	25.258	4.38
Millet	36.5	3.18	28.9445	3.42
Barley	0	0	22.995	4.5
Rice Hulling	99.7545	14.18	0	0

Figure 6: Average processing capacity of IWM, kg/hr.

3.6. Tariff Structure

Tariff structure explains the practice of collecting charge (price) after processing of food grains in IWM. The charge of various food grains varies according to their nature and time consumed while processing. The table below shows the tariff rates charged for each type of food grain in IWM.

Table 13:Tariff Structure Charged in IWM

Agro Processing Price (NRs per kg)	Long Shaft		Short Shaft	
	Mean	S.D.	Mean	S.D.
Maize	1.78	0.35	2.08	0.85
Wheat	2.58	0.37	2.25	0.58
Millet	2.86	0.54	2.61	1.66
Rice Hulling	1.71	0.39	0	0

Source: Field Survey, SETM 2017

In Long shaft on average, Maize is charged NRs 1.78 per kg, Wheat for NRs 2.58, Millet for NRs 2.86. The Rice hulling is charged for NRs 1.71 per kg. Similarly, in short shaft, on average, Maize is charge NRs 2.08, Wheat NRs 2.25, Millet NRs 2.61. Hence it can be concluded that in both types of IWM, the charge of processing Millet is comparatively high.

3.7. Repair and Maintenance

Out of 79 functional IWMs, 90% of the owners had done minor repair and maintenance in their IWM after installation. 10 % of the users said that they didn't perform any repairs and maintenance. There were no cases of major repairs found in the surveyed IWM. However, some of the minor repairs were carried out at local level, mostly by self and the minor problems faced in the IWM operation is discussed in the section below.

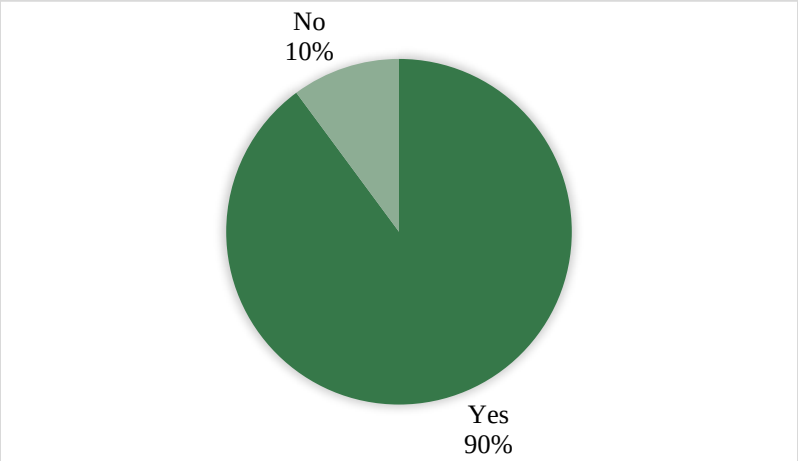


Figure 7: Owners that repaired their IWM after installation

3.7.1 Minor Problems Faced while Operation

The minor problems commonly faced in IWM operation were found related to Takkar and Chakati, Canal, Nozzle, Loss of Flour, Mani/Madani and Bearing. The table below illustrates multiple responses of minor problems stated by the owners in short shaft IWM and long shaft IWM. The overall result shows that about 70.89% of the responses claimed to have minor problems in bearing. 57% of the respondents have problem of Takkar and Chakati, 44 % have problems of Canal, 33% have problem of Nozzle, 8% have problem of output loss. 56% of the respondents have problem of Mani/Madani.

Table 14: Minor Repairs associated with IWM

	Short Shaft		Long Shaft		Total	
Problems	Number	Percentage	Number	Percentage	Number	Percentage
Takkar and Chakati	43	78.18	2	66.67	45	56.96
Canal	32	58.18	3	100.00	35	44.30
Nozzle	24	43.64	2	66.67	26	32.91
Loss of flour	5	9.09	2	66.67	7	8.86
Mani/Madani	43	78.18	1	33.33	44	55.70
Bearing	52	94.55	3	100.00	55	69.62

Source: Field Survey, SETM 2017

Although some minor problems were shared by the surveyed owners, there was no reported long term disturbance in the operation of the IWM as the minor problems were sorted out really quick through local level and self-management approaches. These minor problems did not halt the operation.

3.7.2 Frequency of Repair and Maintenance

The frequency of repair and maintenance denotes the number of times the IWM was subjected to repair and maintenance in a year. The following table shows the number of times both types of IWM was repaired per year. The long shaft IWM was repaired 15 times on average in a year whereas the short shaft was repaired 6 times in a year.

Table 15: Average Number of repair and maintenance per year

	Long Shaft		Short Shaft		Total	
	Average/year	S.D.	Average/year	S.D.	Average/year	S.D.
Repair and maintenance	15.33	6.58	5.58	9.26	6.71	9.26
Stone cutting per year	12	0.92	10.35	7.03	10.41	7.03

Source: Field Survey, SETM 2017

It can be seen that long shaft IWM was repaired comparatively more than the short shaft. Also the stone cutting is often practiced in IWM and the table above shows that the long shaft IWM was subjected to stone cutting 12 times while the short shaft was subjected to 10 time per year.

3.7.3 Arrangements Made for Repair and Maintenance

Various kinds of arrangements were found for repair and maintenance depending upon the type of owner and locality of IWM. It was found that about 91% of the respondents were self-engaged in repairing of the IWM. 8 % of the respondents reached out to local technicians whenever necessary. The least i.e. 1 % of the respondents demanded for the repair from the same installer company whenever required.

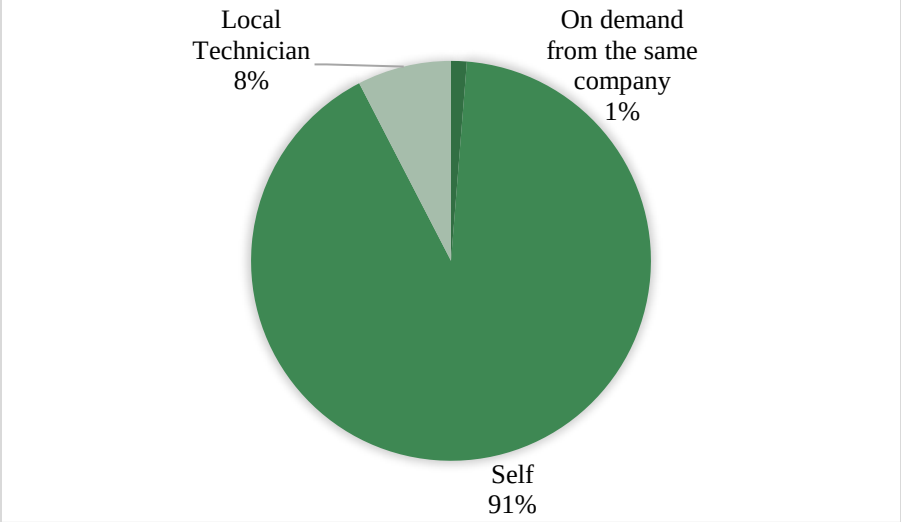


Figure 8: Arrangement made for repair and maintenance

3.7.4 Training for Repair and Maintenance

The IWM owners were asked if they received any kind of training regarding the repair and maintenance of their IWM system, it was found that only 25% of the respondents actually received training for repair and maintenance. Majority (75%) of the respondents received no training related to repair and maintenance of the IWM.

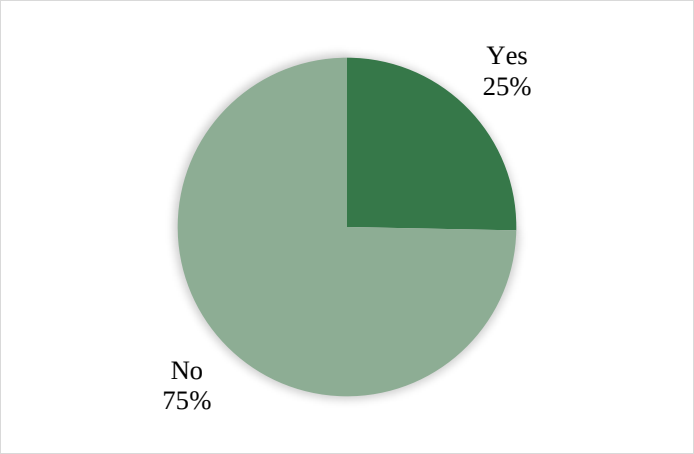


Figure 9: Training received for repair and maintenance

3.8. Service Centers

3.8.1 Nearest Service Centers

The time required to reach the nearest service center of respective IWM varies according to the districts in which the IWM is located. The table below shows the time required in minutes to reach the nearest service center of respective districts.

Table 16: Average time to reach the service center

Districts	Time (in minutes)
Nuwakot	161
Okhaldhunga	180
Salyan	151
Jajarkot	134
Kaski	21
Baitadi	280
Darchula	228
Khotang	660
Overall Mean	**198**

Source: Field Survey, SETM 2017

It was found that the maximum time required to reach the service center was 660 minutes (11 hours) in Khotang district whereas the minimal time required was 21 minutes in Kaski district. Therefore, the service center in Kaski district is near to the IWM site.

3.8.2 Service Delivery from Service Center

A query was asked to the owner's whether the service center delivered service after installation and it was found that 66% of the respondents said the service centers provided services where 34% of them claimed no service provided by the service centers after installation.

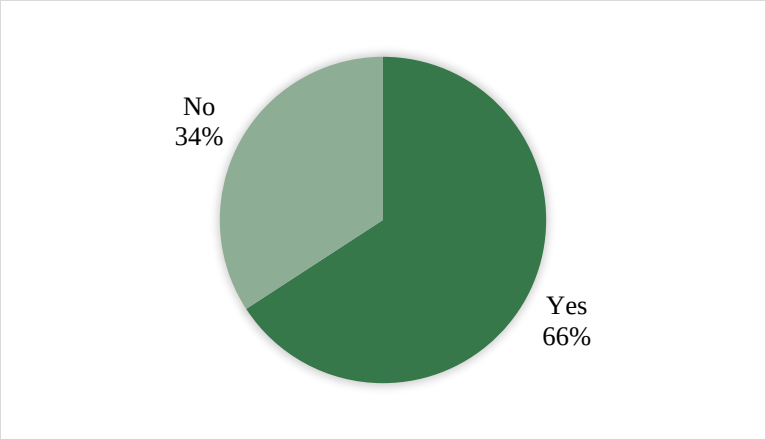


Figure 10: SC Personnel visit at the IWM site

The respondents who acknowledged the service delivery from service centers were enquired about the number of times the SC personnel visited for service delivery. As shown in the table below, it was found that in short shaft IWM a maximum of 6 times and minimum of 1 time the SC personnel visited for service whereas in long shaft a maximum of 2 times and minimum of 2 times. Thus, on average the SC personnel visited 2 times in both types of IWM.

Table 17:SC personnel service after IWM installation

	Short Shaft			Long Shaft		
	Max	Min	Average	Max	Min	Average
Number of Visit of SC personnel after installation	6	1	2	2	2	2

Source: Field Survey, SETM 2017

3.8.3 Satisfaction of the Owner's with the After Sales Service from SCs

The satisfaction level of owners with the after sales service from service centers on the scale of highly satisfied, satisfied, moderately satisfied and not satisfied was assessed. The figure below shows the district wise satisfaction level of owners.

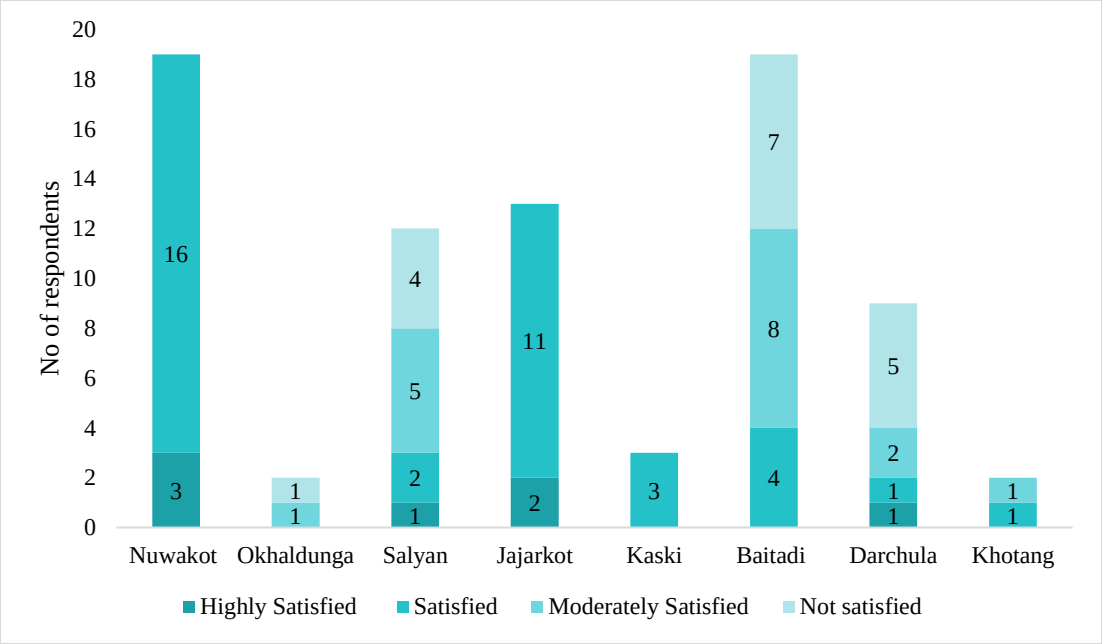


Figure 11: Satisfaction with the after sales service from service centers

The majority of the respondents from district Nuwakot, Jajarkot and Kaski were satisfied with the after sales service from service centers. Whereas 1 respondent from Okhaldhunga, 4 from Salyan, 7 from Baitadi and 5 from Darchula were not satisfied with the after sales service. There were significant number of respondents who had moderate level of satisfaction.

3.9. Assessment of Socio-economic Characteristics of IWM Owners

3.9.1 Family Size

The average family size of owner's in accessible hill was found to be 6 members. The minimum family size was 2 the maximum size was 13. In remote hills the average members of the family were 7. Whereas the minimum family size was 3 and maximum was 12.

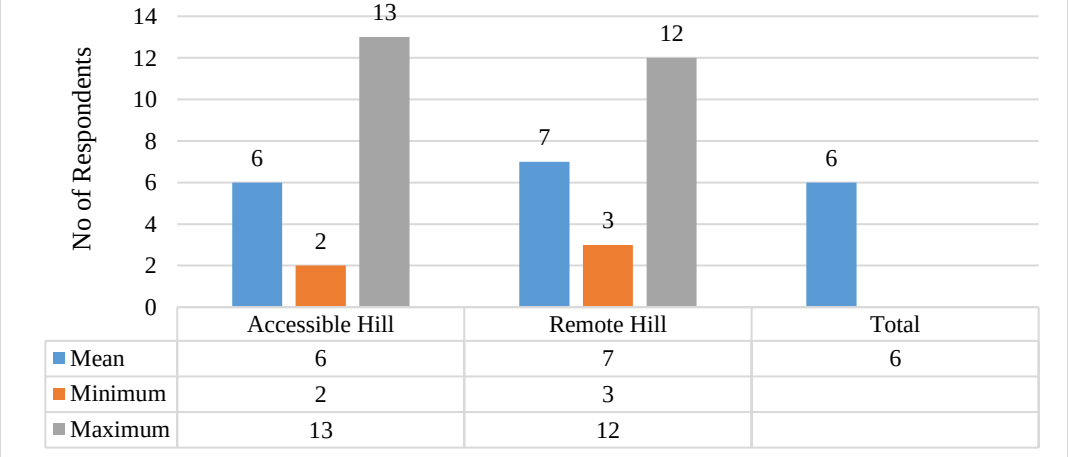


Figure 12: Family Size of Owners

3.9.2 Gender Distribution of IWM Owners

The following figure denotes the gender distribution of IWM ownership among the surveyed samples. The female IWM owners were found to be 5 out of 79 which is approximately 6.32% whereas the remaining 74 were male owners.

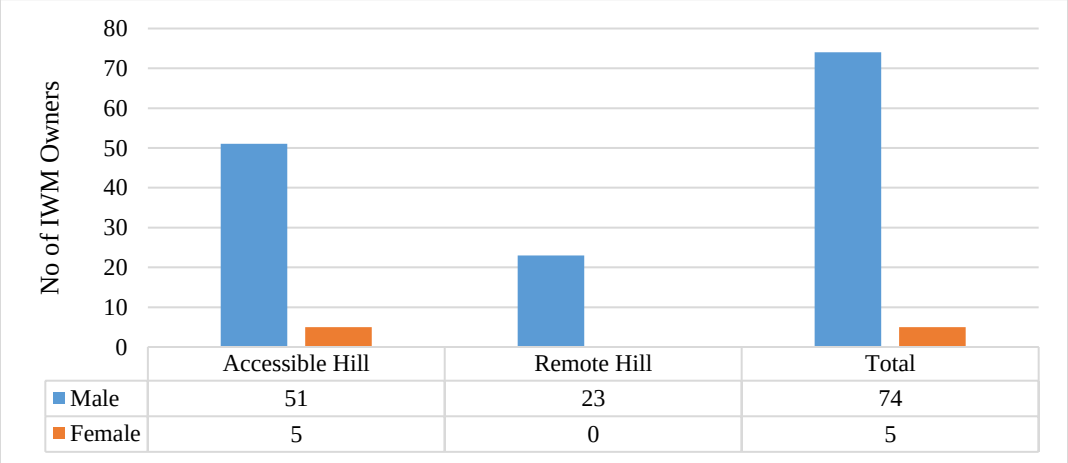


Figure 13: Gender Distribution of IWM Owners

3.9.3 Access to Basic Facilities

Some of the facilities are too important for livelihood and day to day activities. Availability of facilities like toilet, drinking water, communication systems, electricity and radio/television were assessed in the survey and the table below shows the region wise availability of facilities to the IWM owners.

Table 18: Availability of Facilities at Owners Household

Facilities	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Toilet	56	100.00	22	95.65	78	98.73
Drinking water/Tap	55	98.21	17	73.91	72	91.14
Telephone/Mobile	50	89.29	20	86.96	70	88.61
Electricity (Grid)	29	51.79	18	78.26	47	59.49
Radio/Television	35	62.50	16	69.57	51	64.56

Source: Field Survey, SETM 2017

In accessible hills, almost all of the IWM owners have toilet facilities at their household. 98% of the owners have facilities of drinking water, 89% have facilities of communication system like telephone or mobile phone, 52% have facilities of electricity and 62% have radio/television facilities. Whereas in remote hills, 96% of the owners have toilet facilities at their household, 74% have drinking water facilities, 87% have telephone/mobile facilities, 78% have electricity and 70% have facilities of radio or a television.

3.9.4 Education Level

The survey data shows that 17% of the IWM owners are Illiterate. The maximum respondents (34%) are educated till primary level (Grade 1-5). 23% of the respondent owners are Literate only. 14% of the respondents have acquired lower secondary level schooling (Grade 6-8). 4%

respondents in each have acquired secondary level of education (SLC), Higher Secondary Level (Grade 11-12) and Above grade 12.

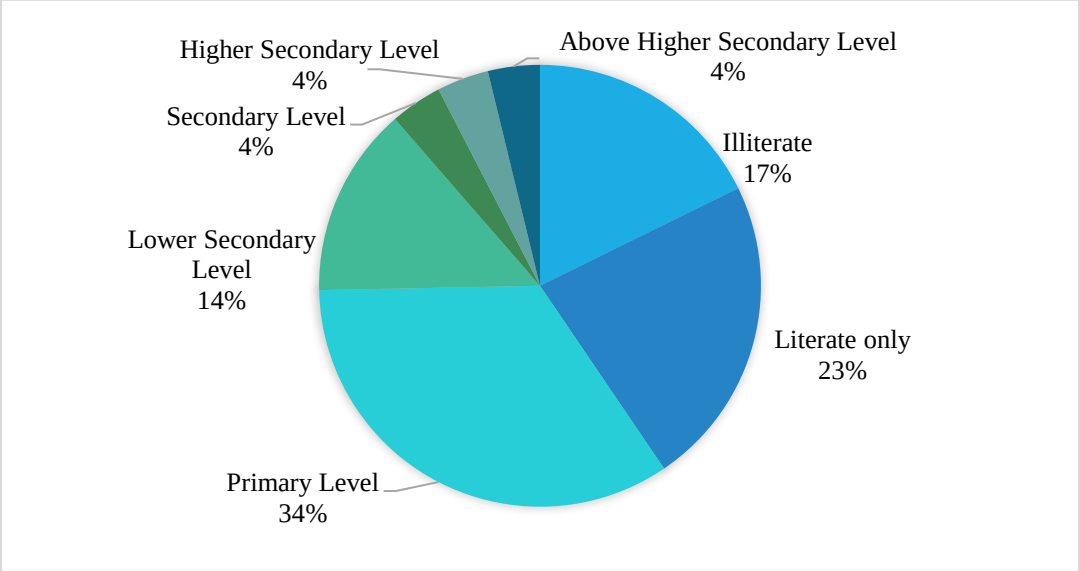


Figure 14: Education Level Status of IWM Owners

3.9.5 Land Ownership of IWM

The land ownership where IWM is operated indicate the property holding classified as private, rented, public or community. It was found that 66% of the IWM land were private, 10% were rented whereas 19% of them were public lands. Only 5% of the IWM were owned by the community. This shows that IWM is more of a private enterprise entity.

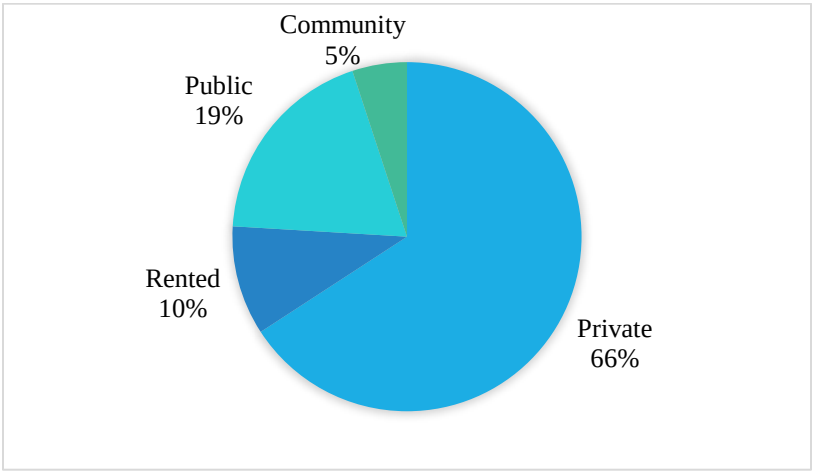


Figure 15: Ownership Status of Land Used for IWM

3.9.6 Source of Information

Information plays significant role for the promotion and distribution of the IWM systems in rural areas of Nepal. Each of the surveyed IWM owner has got information in different ways. According to surveyed data, it was found that 53% got information about IWM from local service center. Similarly, 33% of IWM owners came to know about this technology when they have seen their neighbors' traditional mill were improved or got information from local people or relatives. 8% of

owners got information from the source of newspaper/radio whereas 6% owners affirmatively responded that the AEPC as prime source of information for IWM installation.

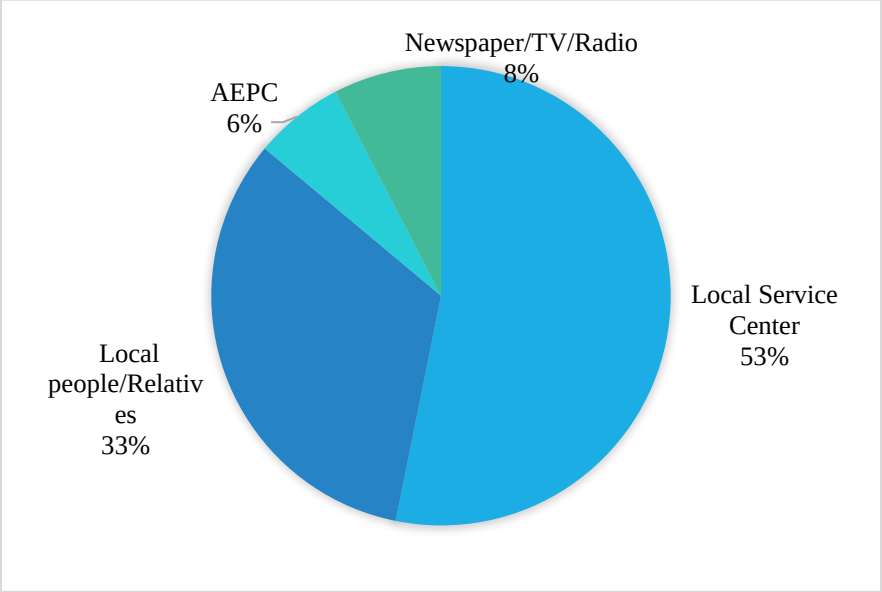


Figure 16: Source of Information about IWM

3.9.7 Decision Making on IWM Installation

67% of the IWM owners stated that the decision of installing IWM was taken by the head of household male member from their family. 27% of the respondents stated that the decision of installing IWM came from the head of household female member.

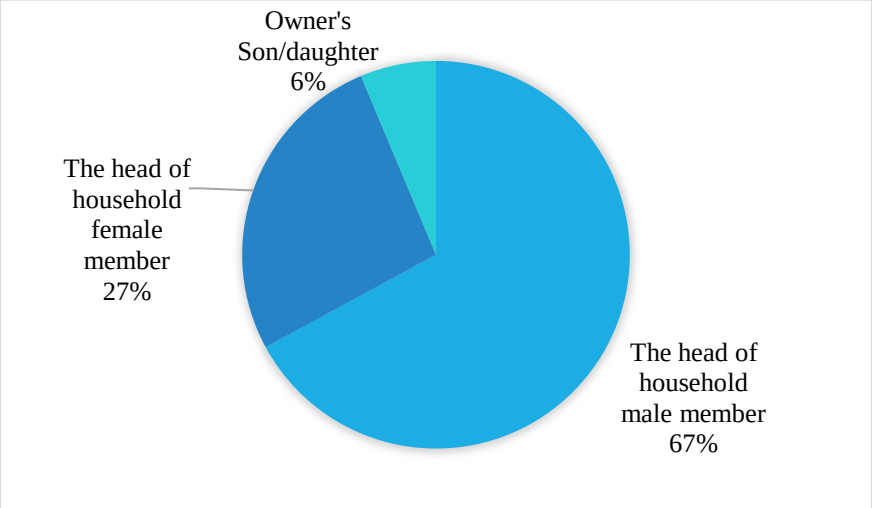


Figure 17:Person Responsible for the Decision of Installing IWM

Only 6% of the respondents stated otherwise the decision to install the improved water mill were from their son or daughter.

3.9.8 Additional Sources of Income

The owners were asked if they had any additional sources of income apart from the IWM operation. 80% of the respondent owners have additional sources of income apart from the income generated by the operation of IWM. 20% of respondent have no any additional sources of income. Hence, 20% of the owners are exclusively dependent on the income from IWM operation.

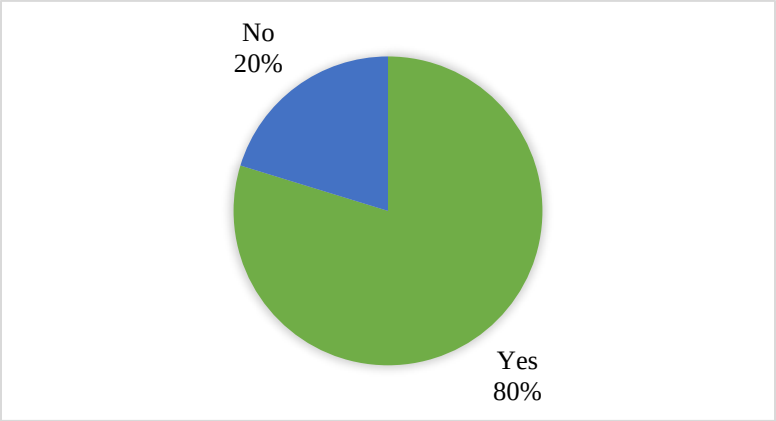


Figure 18:Additional Sources of Income for IWM Owners

3.9.9 Types of Additional Income Source

Those 80% of the respondent owners who had additional business were asked to specify their additional source of income. The figure below shows the distribution of Owners in their respective additional business.

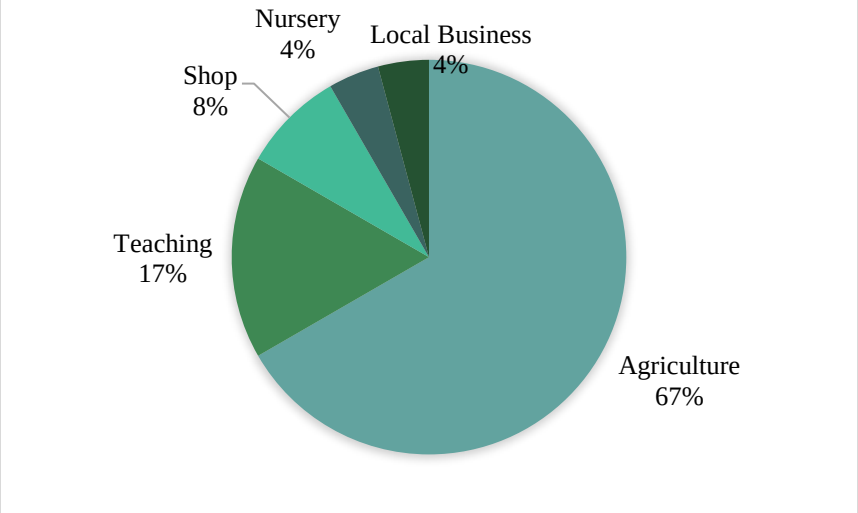


Figure 19:Types of Additional Business of IWM Owners

Majority (67%) of the respondents have agriculture as their additional source of income. 17% of the respondents are involved in teaching and lecturing practices. 8% of them have a shop and 4% each have nursery and local business.

3.9.10 Installation Cost Details

The source of installation of IWM are classified as own investment (self), subsidy from the government and loan. The owners were allowed to answer in multiple choices and the responses

were noted down. The table below shows the distribution of source for installing the IWM system. 68 responses were received for own investment to install IWM. 44 responses were received for support from government subsidy either financial or material provided by the government. 9 responses were received for loan acquirement to install IWM.

Among the self-finance, the maximum was found to be NRs 100000 and a minimum of NRs 2000. The average was found to be NRs 27184. Similarly, the average loan amount was found to be NRs 10875 with maximum NRs 40000 and minimum NRs 1000.

Table 19: Installation Cost Details for IWM installation

Source	Number of Responses	Max	Min	Average
Own investment (Self)	68	100000	2000	27184
Government Subsidy	44	-	-	12945
Loan	9	40000	1000	10875

Source: Field Survey, SETM 2017

3.9.11 Self-management Source

A query was asked to the owners about how they managed their own investment. 77% of the respondent owners said family saving supported their own investment whereas 10% respondents said remittance. 10% of the respondents managed their own investment by selling off properties. 3% said that the investment came from loan installment.

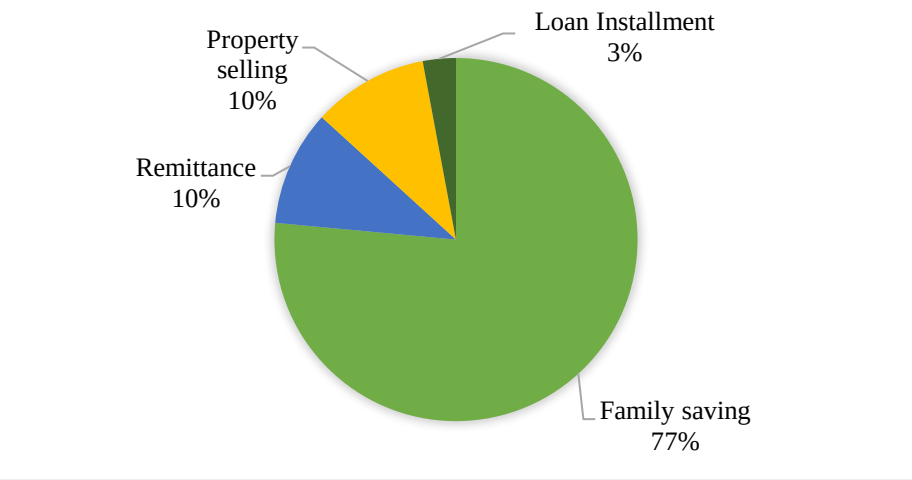


Figure 20: Management of Own Investment

3.10 Assessment of Socio-economic Characteristics of IWM Users

3.10.1 Family Size

The overall family size of users was found to be 6 members on average with a minimum of 2 members and maximum of 11 members. In accessible hills the minimum family size was found to be of 2 members and maximum of 11 members whereas in remote hill minimum of 3 members and maximum of 11 members.

Table 20: Distribution of Family Size

Particular	Accessible Hill			Remote Hill			Total		
	Min	Max	Average	Min	Max	Average	Min	Max	Average
Family size	2	11	6	3	11	6	2	11	6
Household Head	Number			Number			Number		
Male	46			21			67		
Female	10			2			12		
Household Head Age	Min	Max	Average	Min	Max	Average	Min	Max	Average
	30	70	46	30	75	51	30	75	48

Source: Field Survey, SETM 2017

The household heads in accessible hill and remote hill are mostly male though female heads are present with 17.85% in accessible hills and 8.69% in remote hills. The average age of household head in accessible hill was found to be 46 years and in remote hill the average was 48 years.

Table 21: School going children

	Accessible Hill	Remote Hill	Total
School going children	Number	Number	Number
Male	62	35	79
Female	51	19	70

Source: Field Survey, SETM 2017

The number of school going male children in accessible hills was found to be 62 whereas the female children was found to be 51. In remote hills, the number of male and female school going are 35 and 19 respectively.

3.10.2 Access to Facilities

Likewise, in owner's profile, the availability of facilities in users were also assessed. The table below shows the region wise availability of facilities of users at their household.

Table 22: Availability of Facilities in Users Household

Facilities.	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Toilet	56	100.00	17	73.91	73	92.41
Drinking water/Tap	56	100.00	13	56.52	69	87.34
Telephone/Mobile	51	91.07	18	78.26	69	87.34
Electricity (Grid)	34	60.71	21	91.30	55	69.62
Radio/Television	31	55.36	18	78.26	49	62.03

Source: Field Survey, SETM 2017

In accessible hills, all of the users have facilities of toilet and drinking water respectively. 91% of the users have facilities of telephone or a cell phone. 60% of the users have electricity facilities and only 55% users have radio or a television. Similarly, in remote hills, 92% of the users have toilet at their household, 87% of the users have drinking water and communication facilities respectively. 69% users have electricity facilities and 62% have radio or television at their household.

3.10.3 Education Level

10% of the respondent users were illiterate. 15% of the users were basically literate only. 37% being a majority in this regard, were educated till primary level (grade 1-5). 15% of the users acquired lower secondary schooling (Grade 6-8), 14% of the users are educated till secondary level (SLC), 8% of the users were found educated till higher secondary level (Grade 11-12) and 1% of the respondent were educated above the higher secondary level.

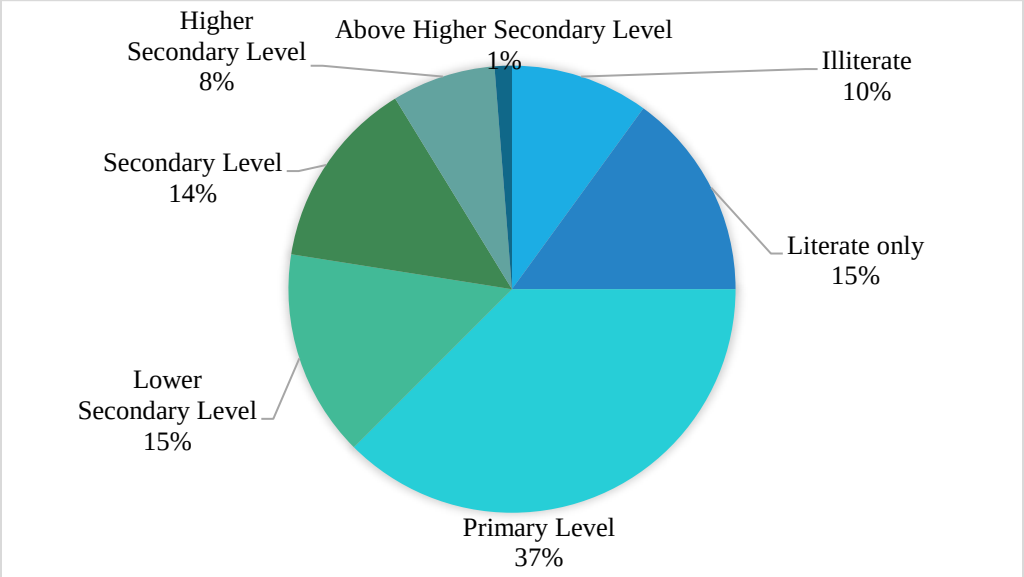


Figure 21:Education Level Status of Users

3.10.4 Main Occupation

The main occupation of the Users was found out to be Agriculture, Business, Government services and teaching etc. The figure below shows that 89% of the users are involved in agriculture. 4% are engaged in business, 1% are engaged in government service, 6% are engaged in teaching sector. Thus, mostly the users are engaged in agriculture so the primary occupation of users in the surveyed areas is agriculture.

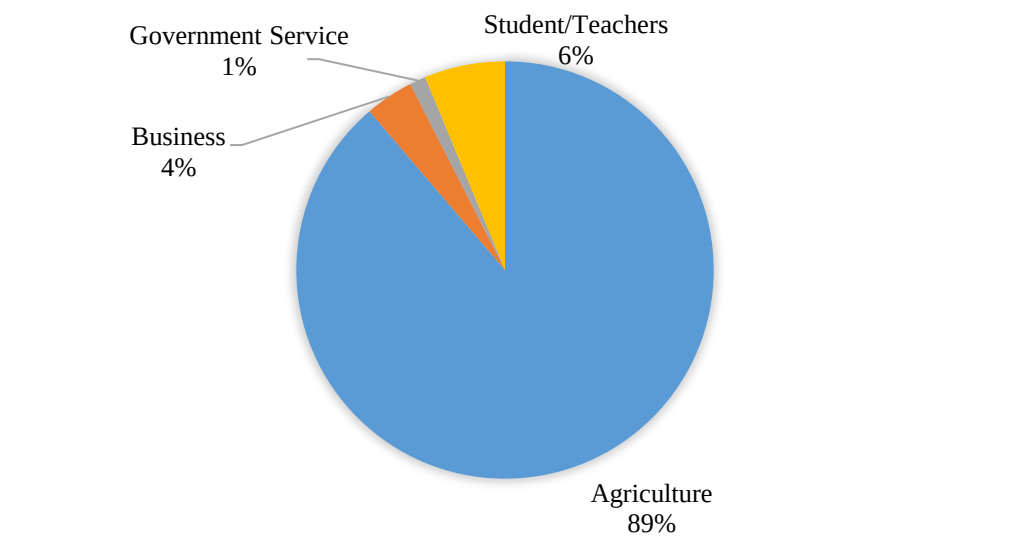


Figure 22: Major Occupation of Users

3.10.5 Food Sufficiency Status

Food sufficiency refers to the status of food/consumable items in the user's household enough to sustain their livelihood. The food sufficiency status is classified as below in the table:

Table 23: Food Sufficiency Status of IWM Users

Food Sufficiency Status of IWM User's	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Up to 3 months	2	3.57	1	4.35	3	3.80
3 to 6 months	12	21.43	12	52.17	24	30.38
6 to 12 months	40	71.43	10	43.48	50	63.29
Surplus	2	3.57	0	0.00	2	2.53
Total	**56**	**100.00**	**23**	**100.00**	**79**	**100.00**

Source: Field Survey, SETM 2017

71% of the users in accessible hill have food sufficient for 6-12 months. 52% of the users in remote hill have food sufficient for 3-6 months. From overall regions, 63% have food sufficient for 6-12 months, 30% users have sufficient food for 3-6 months. Few users were found having surplus amount of food.

3.10.6 Land Holding

The average land owned by the users in accessible hill was found to be 10.25 Ropani. In remote hill the average land owned was found to be 6.71 Ropani.

Table 24: Land Holdings of IWM Users

Land Holding (Ropani)	Accessible Hill		Remote Hill		Total	
	Mean	S.D.	Mean	S.D	Mean	S.D
Total	**10.25**	**6.71**	**6.82**	**4.2**	**9.25**	**6.71**

Source: Field Survey, SETM 2017

3.10.7 Average Annual Income and Expenses

The users were asked about their basic income and expenses in their household. The table below shows that average, minimum and maximum income and expenses of IWM Users.

Table 25: Status of Income and Expenses

Average Annual Income and Expenses (NRs)	Accessible Hill			Remote Hill			Total
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	**Mean**
Income	84,050.00	15,000	500,000	24,812.5	10,000	80,000	**67,125.00**
Expenses	66,937.50	12,500	350,000	24,562.5	10,000	70,000	**54,830.36**

Source: Field Survey, SETM 2017

In accessible hill, the average income of users was found to be NRs 84,050 with a maximum of NRs 500,000 and minimum of NRs 15,000. The average expenses were NRs 66,937.50 with a maximum of NRs 350,000 and minimum of NRs 12,500. In remote hill, the average income was found to be NRs 24,812.5 with a maximum of NRs 80,000. The expenses had an average value of NRs 24,562.5 with maximum of NRs 70,000 and minimum of NRs 10,000.

3.10.8 IWM Distance from Users Household

The average distance from the user household to reach the IWM site was found to be 1.5 Km on average in accessible hill while the distance to IWM site from user household in remote hill was found to be 1.8 Km. The overall average distance was 1.7 Km with a maximum of 8 Km and minimum of 1 Km.

Table 26:Distance to IWM site from User Household

Particular	Accessible Hill			Remote Hill			Total		
	Min	Max	Average	Min	Max	Average	Min	Max	Average
Distance KM	1	8	1.5	1	8	1.8	1	8	1.7

Source: Field Survey, SETM 2017

3.11 Impacts and Benefits of IWM

3.11.1 Support for IWM operation

The family support for IWM operation was enquired with the owners. The respondent owners acknowledged that all the members of family had supported the operation of IWM. This indicates that the people have accepted IWM as a better technology and are supporting the use of IWM.

3.11.2 Income After the Improvement of TWM

A query was asked to the owners regarding the status of profit after the improvement of traditional water mill, all the respondents said the profit was increased or same but none of the respondents said the profit had decreased. Therefore, 58% of the respondents said the profit has increased after the improvement of TWM. 42% of the respondents have stated same as compared to TWM and IWM. Thus, majority of respondent have acknowledged increase in profit and income after the improvement of traditional water mills which indicates positive impact of IWM.

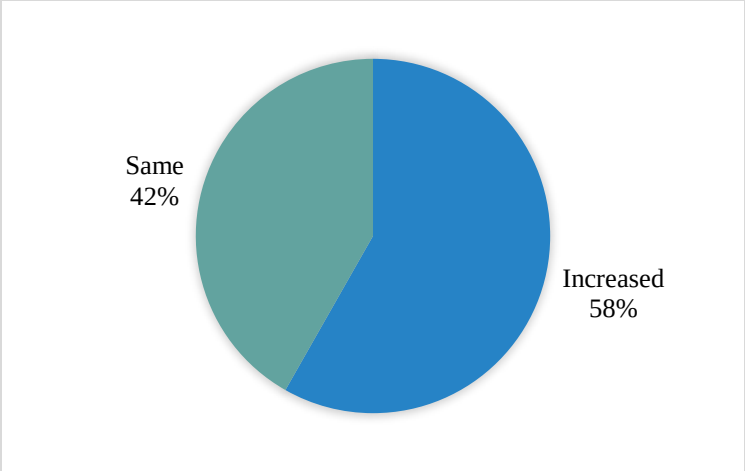


Figure 23: Status of Profit after IWM

3.11.3 Beneficiaries HHs

The table below represents the number of households benefitted by the IWM operation. In accessible hills, the average number of beneficiaries' household was found to be 36 with a maximum of 200 households and minimum of 10 households. In remote hills, the average beneficiaries' household was found to be 72 with a maximum of 300 households and minimum of 10 HHs.

Table 27: Average Beneficiaries Household

Beneficiaries Households	Mean	Maximum	Minimum
Accessible Hill	36	200	10
Remote Hill	72	300	10
Total	**47**		

Source: Field Survey, SETM 2017

3.11.4 Caste Composition of Beneficiaries

The owners were asked to state the caste composition of the households that visit their respective IWM for processing. The table below shows the caste composition of households that visit IWM.

Table 28:Caste Composition of the Beneficiaries Household

Caste Composition of HHs	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Brahmin	193	9.48	273	17.17	466	12.86
Chhetri	749	36.81	697	43.84	1446	39.89
Janajatis	667	32.78	362	22.77	1029	28.39
Dalit	426	20.93	258	16.23	684	18.87
Total	**2035**	**100.00**	**1590**	**100.00**	**3625**	**100**

Source: Field Survey, SETM 2017

In accessible hill, 37% of the households belong to caste Chhetri. 33% belong to Janajatis, 20% belong to Dalits and least 9% belong to Brahmins. While in remote hill, majority (44%) of HHs belong to Chhetri, 23% belong to Janajatis, 16% to Dalits and 17% to Brahmins. It can be seen that the Chhetri and the Janajatis are widely spread among the both geographical regions.

Overall we can see that 19% of the caste composition belongs to the Dalit community benefitted by the IWM. As given the history and practice of discrimination in rural areas, this indicates harmony and no discrimination between castes and IWM has brought secularity and feeling of wholeness between the communities. A query was asked to the users regarding if the owners were biased or not and 91% of the users said that the owners were not biased. This majority can be subjected to positive understanding between the community people and the owners. Unity can be found in diversity and thus the study team has found no incidences of discrimination or separation between different castes visiting IWM.

3.11.5 Coverage of IWM

The IWM coverage is analyzed by the time taken by the farthest customers to reach the respective IWM site. The average time taken by farthest customers in accessible hills was 73 minutes and in remote hill was 82 minutes. A maximum of 300 minutes to minimum of 10 minutes' distance was found during the field survey.

Table 29: Coverage Area of IWM

Time taken by farthest customers to visit IWM (minutes)	Mean	Maximum	Minimum
Accessible Hill	73.16	300	10
Remote Hill	82.17	180	20
Total	**75.78**	300	10

Source: Field Survey, SETM 2017

It can be said that the IWM has covered the users within proximity of 10 minutes' distance to 300 minutes' distance with an average of 75 minutes.

3.11.6 Daily Visit Trends

The daily visit trends show the total number of customer flow to IWM on average. It was found that in short shaft 5 customers visited IWM daily while there were a minimum of 1 to maximum of 20 customers. While in long shaft, 10 customers on average visited IWM daily with minimum of 5 to maximum of 20 customers per day.

Table 30:Total Consumers Visiting IWM on Daily Basis

Total Consumers visiting daily	Average	Minimum	Maximum
Short Shaft	5	1	20
Long Shaft	10	5	20

Source: Field Survey, SETM 2017

The table below shows the classification of customers visiting IWM daily for processing of food grains. The classification of customers is based on adult male, female and children male and female.

Table 31: Classification of Customers in Daily IWM Visits

Daily trend of IWM visit	Short Shaft			Long Shaft		
	Average	Minimum	Maximum	Average	Minimum	Maximum
Adult Male	2	1	4	3	3	3
Adult Female	3	1	12	7	4	10

Female Children <16	1	1	4	4	4	4
Male Children < 16	1	1	2	3	3	3

Source: Field Survey, SETM 2017

The survey data reveals that in short shaft, the average frequency of adult male visiting IWM is 2 whereas adult female visiting is 3. On average the number of both the male and female children visiting IWM is 1. In long shaft, it was found that the average number of adult male visiting IWM is 3 and female is 7. The number of female children visit on average is 4 and the male children is 3. From the data it can be said that the number of adult female visiting IWM is greater than the male and children. The number of adult female varies from 1 to 12 in short shaft and from 4 to 10 in long shaft.

3.11.7 Employment Opportunities

The owners were asked about the employment opportunities created by the operation of IWM. The category of employment was generated on basis of self and additional which indicate the employment created at local level because of IWM. Self-employed denotes the owners working at their own enterprise while additional denotes extra personnel hired to do a given task.

Table 32:Employment Opportunities Created Due to IWM

Self-employment	**79**
Additional employment	12

Source: Field Survey, SETM 2017

79 of the Owners were self-employed at their IWM business operation and the family members were also found contributing in the IWM. However, involvement of own family members was not counted as a direct employment but 12 additional employments were found involved to facilitate the operation of IWM. This shows that IWM being a small rural technology can create opportunities for employment. It can be concluded has bought employment at local level and the owners are at least engaged in income generating activities. The surveyed IWM had shown employment at local level and it can be projected that the IWM spread throughout the country had generated such types of employment which basically is an essential part in economic development.

3.11.8 Comparative Performance Before and After IWM

A query was carried out to compare the performance of traditional water mill (TWM) and the improved water mill (IWM) and for this purpose the owners were enquired about the average amount of food grain processed by mill before and after improvement. The table below illustrates the amount in kg processed per hour by the IWM.

Table 33: Comparative Performance between Traditional Mill and Improved Mill

Comparative performance before and after improvement	**Before Improvement (kg/hr.)**	**After Improvement (kg/hr.)**
Crops	**Mean**	**Mean**
Maize	13.69	24.35
Wheat	16.13	26.86
Millet	15.80	26.35
Rice	-	54.75
Barley	11.35	23.50

Source: Field Survey, SETM 2017

Before improvement, 14 kg of Maize was processed while now 24 kg of Maize is processed in an hour. 16 kg of Wheat was processed hourly before and now about 27 kg are processed in an hour. Similarly, the processing of other crops such as Millet and Barley has been significantly increased after the improvement from traditional to improved water mill.

3.11.9 Agriculture Production Pattern

The agricultural production pattern shows the types of crops produced and farmed by the users in their household or cultivable farm land.

Table 34: Agricultural Production Pattern in User's Farm Yearly

Types of Crop Grown (per year)	Accessible Hill			Remote Hills			Total		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Rice	627.8	73	1460	328.5	73	876	562.1	73	1460
Wheat	416.1	73	1241	635.83	73	1095	451.14	73	1241
Maize	587.65	73	1460	913.96	292	2190	673.06	73	2190
Millet	280.32	73	730	1460	1460	1460	365	73	1460
Barley	156.95	73	292	248.2	219	365	182.5	73	365
Mustard	63.875	36.5	73	73	73	73	73	36.5	73

Source: Field Survey, SETM 2017

In accessible hill, the mostly cultivated crop was found to be Rice which is produced on average 627 kg in a year. Maize is the second most popular crop produced on average 587 kg in a year whereas the least cultivated is mustard with 156 kg of production per year. In remote hill, the mostly cultivated crop is Millet with 1460 kg of production per year, secondly Maize is cultivated with 913 kg production yearly.

3.11.10 Major benefits of IWM

There is no doubt that IWM technology has better efficiency or processing capacity than traditional water mill. It has multiple benefits and can offer diversified range of services. Majority of the surveyed owners and users expressed their satisfaction towards improved water mill. At the time of field visit, they expressed multiple reasons of positive impacts that IWM have made to users. The responses were received affirmatively for different kinds of positive activities that they have gained after its improvement. The following were the major benefits at users' level;

- Agricultural Works Carried Out
- Fast Processing
- Easy to Operate
- Low Processing Cost
- Good Quality of Products and Taste

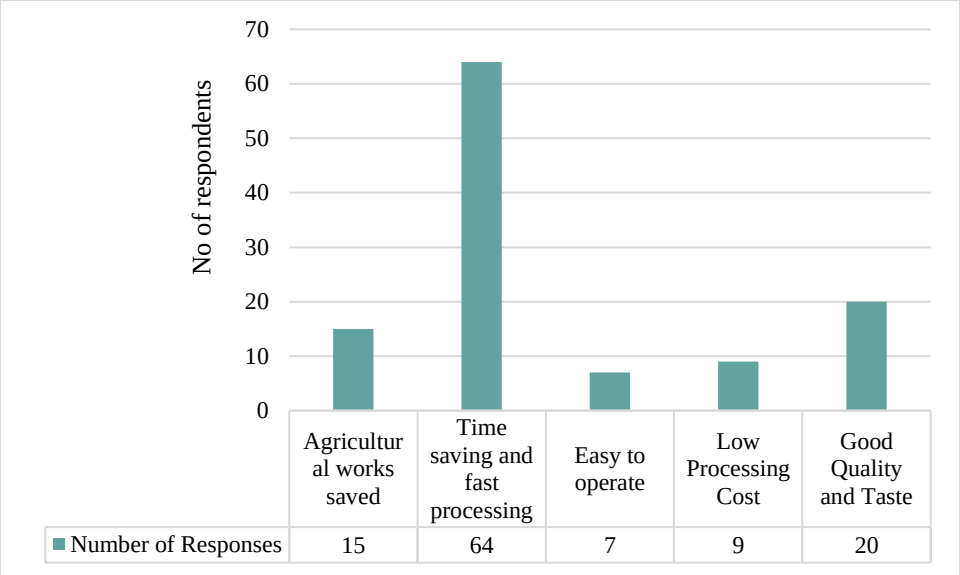


Figure 24: Major Benefits of IWM from Users View

From the chart it can be seen that majority of the responses regarding the IWM benefits has been received for time saving through fast processing. Previously in traditional mills, the processing time was high and the technology itself was time consuming. But after improvement, much time is saved and the saved time is utilized by the users in performing various productive works. 20 responses were received regarding the good quality of food and better taste from IWM. Previously in other technologies the end products were not as good as end products from IWM. Some users reported smell of diesel previously but in IWM the users are satisfied with the quality and taste of end products. The users also reported that IWM had low processing cost than any other technologies. This indicate savings in monetary value as well. The users have reported agricultural works saved due to IWM. Thus, Users seem very satisfied with the IWM technology and its benefits.

3.11.11 Reasons for IWM visit

As discussed earlier there are many benefits of IWM and as supported by the users, IWM has been helping in agro processing works and with better quality and reasonable cost. Along with the benefits, the users were asked to state the reason behind their willingness in visiting IWM. Many responses were received regarding the query which can be summarized below:

- Income Generation
- Good Quality
- Low Cost
- Utilization of resources
- Nearby
- No alternate option

The users were satisfied with the IWM technology and because IWM saved time users could perform various works at their leisure, Users have reported their reasons to visit IWM as income generation from the saved time due to IWM. IWM doesn't require much time like in traditional mill hence users are motivated for IGA. Also most of the users have claimed good quality of food

and taste as a reason for their IWM visit. As mentioned earlier, IWM is cheaper than other technologies and hence this was one of the reasons the user visited IWM as the tariff rates are fairly reasonable. Most of the users had the IWM near to their household so it was another contributing factor for the nearby users to visit IWM. IWM facilitated utilization of resources and it was best alternative for agro processing works. Moreover, some users were found reporting no any other option for processing so the choice was IWM only.

3.12 Overall Satisfaction with IWM Technology

3.12.1 Satisfaction at Owners' Level

Satisfaction level from Owner's point of view on various indicators were assessed. The table below shows the satisfaction level of owners with the related parameters and indicators.

Table 35: Overall Satisfaction of Owners with related parameters

Owners' Satisfaction	Very High		High		Normal		Low	
	Nos	Percent	Nos	Percent	Nos	Percent	Nos	Percent
Quality of technical services			16	20.25	50	63.29	13	16.46
After installation technical backstopping				0.00	40	50.63	39	49.37
Frequency of maintenance requirement			17	21.52	16	20.25	46	58.23
Availability of spare parts			1	1.27	49	62.03	29	36.71
Technical difficulty			14	17.72	32	40.51	33	41.77
Cost of maintenance			43	54.43	36	45.57		
Satisfaction with AEPC/NRREP services and performances	16	20.25	32	40.51	30	37.97	1	1.27
Satisfaction with the installer company	32	40.51	16	20.25	8	10.13	23	29.11
IWM brought happiness among the beneficiaries	33	41.77	46	58.23				
IWM is reasonable for the poor	14	17.72	20	25.32	35	44.30	10	12.66
Accepted as better rural technology for agro-processing	32	40.51	45	56.96	2	2.53		
Installation cost of IWM	15	18.99	15	18.99	49	62.03		
Satisfied with the performance of IWM	29	36.71	32	40.51	18	22.78		

Source: Field Survey, SETM 2017

63% of the respondent owners have normal satisfaction with the quality of technical services provided. 51% of the respondents have normal satisfaction with the technical backstopping after the installation. 58% of the respondents have low satisfaction with the frequency of maintenance requirement. 62% of the owners have normal satisfaction with the availability of spare parts. 42% of the respondents claim low technical difficulty. 54% of the respondents have high satisfaction with the cost of maintenance. 20% owners have very high level of satisfaction with the AEPC/NRREP services and performances, 41% have high satisfaction with AEPC/NRREP services. Similarly, 40% of the owners are very highly satisfied with the installer company. 41% of the respondents very highly support the fact that IWM has bought happiness among the beneficiaries whereas 58% of the respondents have high support. 44% of the owners have normal level of satisfaction with IWM being reasonable for poor. 57% of the owners have highly accepted IWM as a better technology for agro-processing. 62% of the respondents have normal satisfaction with the installation cost of IWM. 40% of the owners are highly satisfied with the performance of IWM. Thus, majority of satisfaction level of owners are in good level which indicates IWM has

created positive influence over the people and has proved to be an efficient technology in the rural areas that made the users satisfied and supportive.

3.12.2 Satisfaction Level of IWM Users'

3.12.2.1 Reduction in Drudgery

Reduction in drudgery plays an important role in satisfaction of the consumers and end users. Reduction in drudgery indicates that the technology is effective and can reduce human effort to significant level. The survey data reveals that IWM has indeed helped in reduction of drudgery of all types of users.

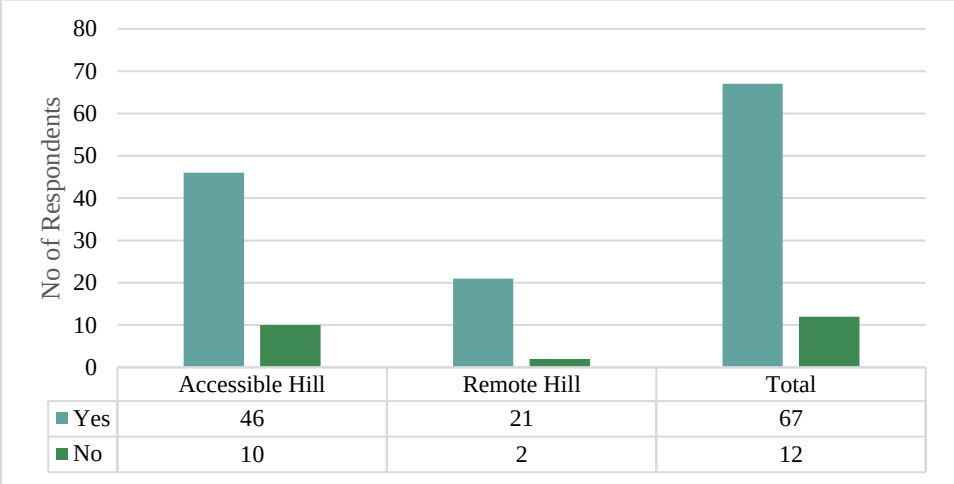


Figure 25: Reduction in Drudgery of Women and Children

Basically as discussed in previous chapter, adult females were mostly visiting IWM rather than male. A query was asked specifically to assess the reduction of drudgery of women and children. It was found that 82% of the users in accessible hill have felt reduction in drudgery of women and children. Whereas 91% from remote hill have felt reduction in drudgery of female and children. As per the data obtained from field study, it can be anticipated that not only the surveyed IWMs but overall IWMs have reduced the human effort and work load. Thus, this shows that IWM has effectively helped in reducing human turmoil, excessive effort and physical load to women and children.

3.12.2.2 Sufficiency Status of IWM

The users were asked if the existing IWM were sufficient for their agro processing of the community. The data shows that in accessible hill, 77% of the IWM users said that the IWM was sufficient for the agro food processing whereas 23% claimed the IWM was not sufficient for processing.

Table 36: Sufficiency Status of IWM

Sufficiency of IWM	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Yes	43	76.79	21	91.30	64	81.01
No	13	23.21	2	8.70	15	18.99
Total	**56**	**100.00**	**23**	**100.00**	**79**	**100.00**

Source: Field Survey, SETM 2017

While in remote hill, 91% users agree that the IWM is sufficient whereas 9% don't agree in IWM being sufficient for agro processing.

3.12.2.3 Changes in Agriculture Production After IWM

66 out of 79 users claim that the agricultural productivity has been increased after the improvement of traditional water mill. 13 claim that there has been no change in production before and after improvement.

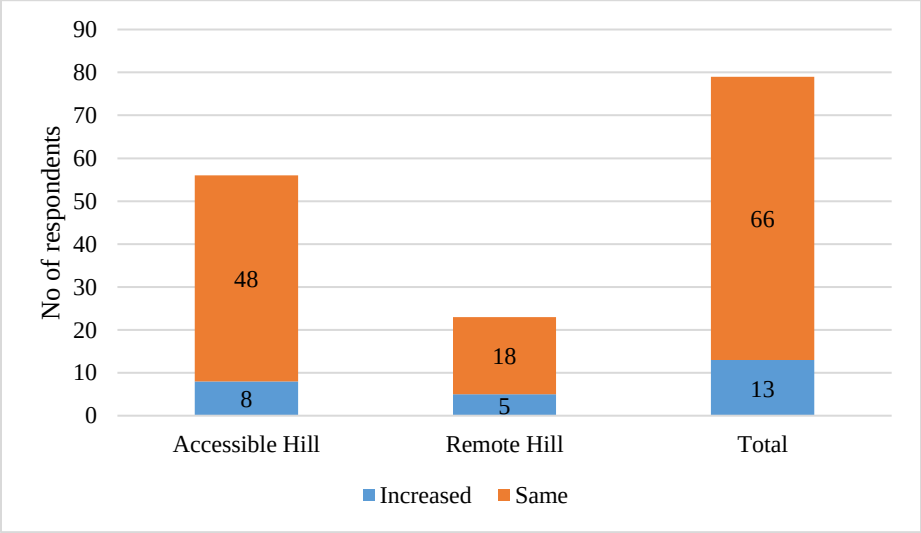


Figure 26: Agricultural Production Status after Improvement

Region wise, 86% of the users in accessible hill have said increment in agricultural production after IWM and 78% users in remote hill have said increment in production. Rest of the users said no change occurred before and after. Hence there were no respondents who claimed decrease in productivity and majority claimed increment so that signifies IWM has provided positive benefits to the user.

3.12.2.4 Responsibility of IWM Visits

The table below shows the comparison of average monthly frequency of IWM visits from user family household. Previously in accessible hill and remote hill before improvement, the adult female visited 4 time on average whereas after improvement the adult female visited 2 times in a month. Previously, the number of times adult male visited IWM was 3 and afterward it was just 2 times in a month. Similarly, the average number of times visiting IWM before and after improvement of all the family members has been decreased.

Table 37: Monthly Frequency of IWM visits

Monthly Trend of customers visiting IWM (Average)	Accessible Hill		Remote Hill		Total	
	Before	After	Before	After	Before	After
Adult Female	4	2	3	2	3	2
Adult Male	3	2	3	2	3	2
Female Children <16	3	1.5	2	2	2	2
Male Children <16	2	2	-	-	2	2

Source: Field Survey, SETM 2017

Table 38: Average quantity of Food Grain by Users per visit

Average quantity by the users per visit (kg)	Accessible Hill	Remote Hill	Total
	Mean	Mean	Mean
Adult Female	31.64	33.14	32.13
Adult Male	33.28	36.4	34.10
Female Children <16	22.75	25	24.5
Male Children <16	20.25	-	20.25

Source: Field Survey, SETM 2017

The average quantity of food grain taken by adult female per visit was found to be 32 kg and adult male was found to be 34 kg. As from table above, it can be seen that the average quantity of food grain taken by the users to IWM for processing has been increased but the frequency of visit has been decreased this shows that the improved water mill processes more capacity than the traditional water mill so the users are not subjected to visit IWM frequently. Furthermore, they carry more quantity of food grains as the IWM is much faster. This also saves time and effort for the users so that they can utilize the time in other productive activities.

3.12.2.5 Utilization of Saved Time

As IWM has fast processing, many of the users have time saving due to IWM. A query was asked to the users if there was any time saving in agro processing. 96% of the users in accessible hill said that IWM has reduced time for agro processing. In remote hill, 91% claimed time saving. Overall it was found that 95% of the users reported in time savings due to IWM.

The users who claimed time savings in IWM were further asked to specify their time saved in minutes of each family members. It was found that in accessible hills, the time saving of an adult female was found to be 47 minutes on average. The time saving of an adult male was 24 minutes on average whereas children female and male had time savings of 22 minutes and 17 minutes respectively.

Table 39: Time Saved for Agro Processing

Time saved for agro processing (minutes)	Accessible Hill		Remote Hill		Total	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Adult Female	47.291	47.86	50.83	56.15	48.25	47.86
Adult Male	24.44	25.101	48.43	27.84	34.025	25.1
Children Female	22.26	3.53	60	-	35	21.79
Children Male	17.5	10.61	-	-	17.5	10.61

Source: Field Survey, SETM 2017

Time savings leads to leisure time and the users were further asked to justify their utilization of the time savings. It was found that majority of the users were utilizing their time by performing agricultural works. In accessible hills, 43% of the user and in remote hill 65% of the user were engaged in agricultural activities after time saving in IWM. 25% users were engaged in income generating activities in both regions. While 25% users in accessible hill and 10% users in remote hill were engaged in household activities.

Table 40: Utilization of Saved Time

Utilization of saved time (in %)	Accessible Hill	Remote Hill	Total
Agricultural works	43.33	65.00	48.75
Household activities	25.00	10.00	21.25
Income Generating activities	25.00	25.00	25.00
Study	6.67	0.00	5.00

Source: Field Survey, SETM 2017

3.12.2.6 Satisfaction with Tariff Structure

The table below shows the comparison of tariff rates charged in IWM mills with other mills. The other mills include diesel mills and traditional water mills (TDM). 53% in accessible hill stated that IWM mill is cheaper than the other mills. 48% in remote hills stated IWM was cheaper. 45% in accessible hills and 48% in remote hills felt no change in rates of IWM mill and other mill. There were very few respondents who felt IWM was expensive. Thus, this indicates that in terms of tariff too the users are satisfied with the processing cost as maximum users felt IWM was cheaper than any other technologies.

Table 41: Unit Price Comparison

Unit price compared with other type mills	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Expensive	1	1.79	1	4.35	2	2.53
Same	25	44.64	11	47.83	36	45.57
Cheaper	30	53.57	11	47.83	41	51.90
Total	**56**	**100.00**	**23**	**100.00**	**79**	**100.00**

Source: Field Survey, SETM 2017

Figure 27: Satisfaction with the Tariff Structure

3.12.2.7 Quality of End-Products

The IWM users were asked to state the quality of the end products from IWM. On basis of regions, 48% users in accessible hills and 47% users in remote hill claimed that the end products from IWM were of good quality. 39% of the users in accessible hill and 21% of the users in remote hill said the end products were of excellent quality.

Table 42:Quality of End-Products

Quality of End Products from IWM	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Excellent	22	39.29	5	21.74	27	34.18
Good	27	48.21	11	47.83	38	48.10
Satisfactory	7	12.50	7	30.43	14	17.72
Total	**56**	**100.00**	**23**	**100.00**	**79**	**100.00**

Source: Field Survey, SETM 2017

Some of the users in both the regions mentioned the quality of the end products were satisfactory. The above data reveals that maximum of the IWM users were satisfied and content with the quality of end products produced by the IWM. The consumers are delighted and support the operation of IWM for better quality production.

3.12.2.8 Income Generating Activities

Income generating activities plays a vital role in satisfaction and the sustainability of the IWM operation. The users were asked if IWM has helped in any form of income generating activities. 96% users in the accessible hill and 82% users in remote hill have agreed that the IWM has helped in income generation activities.

Table 43: Status of IGA Activities by IWM

Helping in IGA	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Yes	54	96.43	19	82.61	73	92.41
No	2	3.57	4	17.39	6	7.59
Total	**56**	100.00	**23**	**100**	**79**	100.00

Source: Field Survey, SETM 2017

The respondents who agreed on IWM helping in income generation activities were asked to state the reasons. The respondent's users said that time saving was the prime reason because of which IWM was helping in IGA. the low processing cost of IWM and availability of adequate resources were also some reasons for IGA by IWM.

3.12.2.9 Satisfaction from IWM Technology

The overall satisfaction of the IWM technology is listed below in the table 48. 32% users in accessible hill and 17% of the users in remote hill have excellent satisfaction level with the IWM technology. 62% of the users in accessible hill and 78% of the users in remote hill have good satisfaction level with the IWM technology. 5% in accessible hill have satisfaction level from accessible hill. Whereas 4% in remote hill have poor satisfaction level with the technology.

Table 44: Satisfaction with the IWM Technology

Overall Satisfaction from IWM technology	Accessible Hill		Remote Hill		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Excellent	18	32.14	4	17.39	22	27.85
Good	35	62.50	18	78.26	53	67.09
Satisfactory	3	5.36	0	0.00	3	3.80
Poor	0	0.00	1	4.35	1	1.27
Total	**56**	**100.00**	**23**	**100.00**	**79**	**100.00**

Source: Field Survey, SETM 2017

As it can be seen that majority of the users have stated good level of satisfaction with the IWM technology, it can be concluded that IWM has received positive response and the users are satisfied.

3.12.2.10 Satisfaction with the IWM Owners

The users were enquired about their satisfaction level with their respective owners of IWM. 96% of the overall users were satisfied with the IWM owners.

Those respondent users who were satisfied with the IWM owner were asked to denote their level of satisfaction on basis of excellent good or satisfactory. Majority (66%) of the users had good level of satisfaction with their respective IWM owners. 31% of the users had excellent level of satisfaction with the owners. Very few (3%) of the users had satisfactory level with the IWM owners.

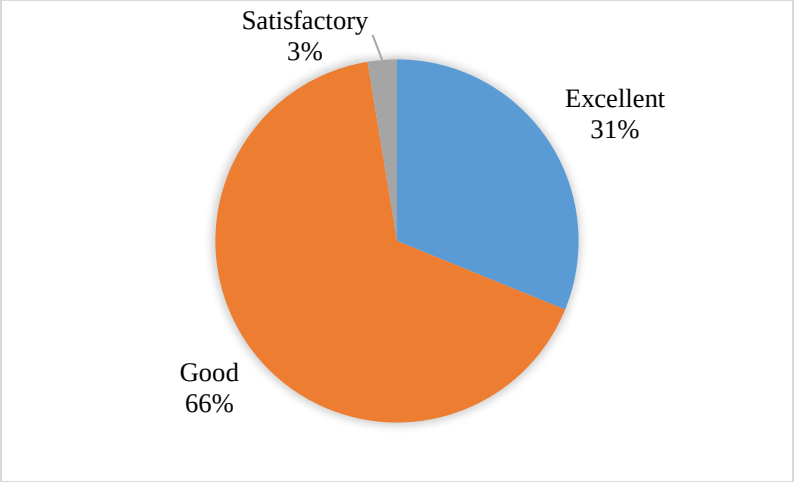


Figure 28: Level of Satisfaction with the Owners

3.12.2.11 Satisfaction with Service Delivery from Owners

A query was asked to the users if the owners provided timely service in the IWM. 97% of the users claimed that the owners provided timely service in the respective IWM while 3% were not receiving timely service. Furthermore, the users who didn't receive timely service from owners were asked if they had to wait for their turn in processing at the IWM. The respondents answered that they had to wait for 3 hours to 2 days for their turn in processing or until their substance was processed at the IWM.

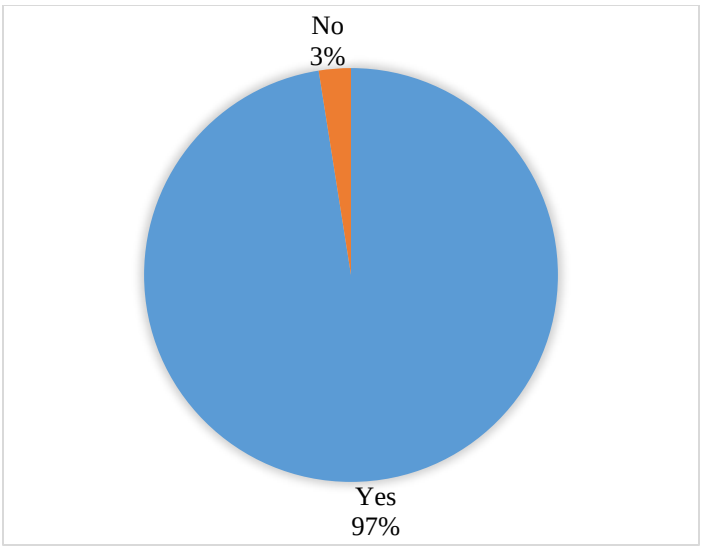


Figure 29: Timely Service from Owner

3.12.2.12 Need of going to other IWMs

The users were also asked if they ever felt the need of going to other nearest IWM for agro processing and the surveyed data revealed that 87% of the users never felt the need of going to other IWMs whereas 13% of the user respondents have sometimes felt the need of going to other IWM.

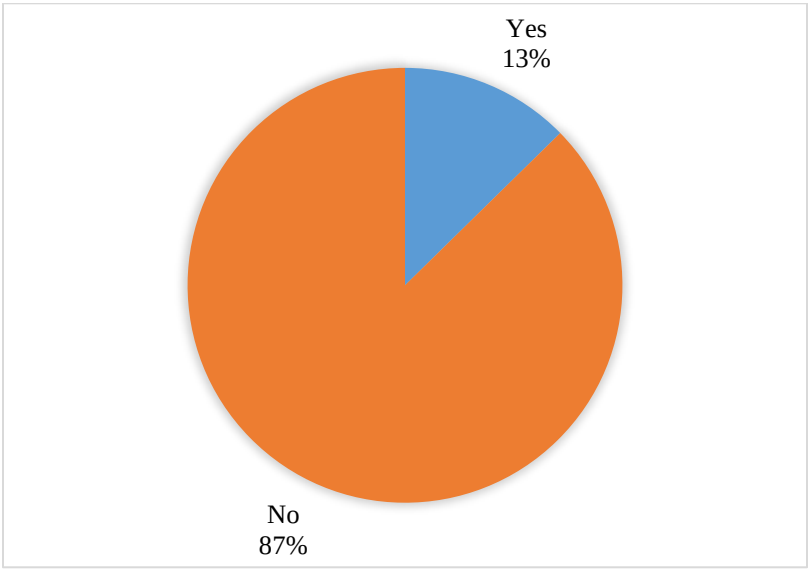


Figure 30:Need of Going to other IWM for Processing

The users who felt the need of going to other IWM stated the reasons behind that was closing of the mill, under-construction of mill, not in operation and sometimes when there was a long queue.

3.12.3 Suggestions for Improvement of the Overall Performance

During the end-phase of the survey, the users were asked to suggest for the improvement of overall performance of the IWM, the overall answers of the users are mentioned below:

- Improvement in the size of canal and nozzle.
- Increment in the size of IWM operation house.
- Conversion of short to long shaft IWM for rice hulling purposes and electricity.

4. Conclusion and Recommendations

4.1. Conclusion

Water Mill is an eco-friendly technology and as it is evident that the Improved water mill has greater advantage than the traditional water mill over variety of factors such as power delivery, time saving through faster processing, better capacity and efficiency. The user satisfaction study on Improved water mill was successfully undertaken by the survey team integrating all the objectives specified by as per the ToR of the project. The following conclusions can be generated from the overall findings of this project:

- IWM is mostly used for agro processing of the food grains in various regions where the electrical mill is not so pronounced
- Mostly many of the IWM users have practice of visiting short shaft IWM than long shaft
- IWMs with Seasonable operation can be found in the areas where there is lack of adequate water resources and is functional mostly during monsoon season
- IWM operation and installation is supported by almost member of a family
- IWM has facilitated in income generation activities of both owners and the users
- IWM has indeed helped in reduction of drudgery and human turmoil as specifically agreed by majority of the users
- IWM has benefitted various ethnic groups such as Janajatis, Dalits etc.
- IWM has created self-employment and additional employment in local levels
- IWM has facilitated in increasing agricultural production and covering a wide range of households
- IWM has helped in reduction of time for agro processing of adult male and female also the children male and female.
- With the reduction in time, users have been able to utilize their saved time by performing productive activities like agricultural works, income generating activities, household works etc.
- Majority of users believe that IWM has greater benefits like low processing cost, good quality of production and better taste of foods.
- The tariff rates charged in IWM processing was found fairly reasonable by most of the users compared to other technology
- Users have good satisfaction level with the IWM technology, with the respective owners and operatives

Most of the users have expected to get facilities of long shaft IWM by replacing their short shaft IWM. It can be said that IWM has proven to be an effective technology that has bought satisfaction among the users and has helped in agro processing works.

4.2. Recommendations

Based on the above conclusions and results withdrawn from this satisfaction survey, the study team would like to recommend trainings regarding the repair and maintenance of the IWM to the owners and operatives so that the repairing can be done at local level without having to shut down the IWM for specific time. Initiation and conducting of awareness programs advocating the benefits of IWM to the users and income generation strategy to owners can be of great step in near future. IWM is an environment friendly technology and the promotion of IWM in various regions for alternative energy and utilization of resources properly is a must needed implementation. Furthermore, time and again monitoring of installed IWM, providing equipment which is rarely available at the local market and facilitate the use of IWM at full potential is suggested by the study team.

Annex

Annex-1: Questionnaires

A. Questionnaire for Improved Water Mills (IWM) Owners

Firm No. (For Official Use Only)	Interview date	Name of Enumerator	Survey Location
Form ID :	DD/MM/YY	ENUM	PLACE
Code of district	Code of Eco-belt	Code of Dev Region	VDC and Ward
Respondent's Name	Male 1 / Female 2	Age: _____	Ethnicity:_____
Name of the IWM owner	Male 1 / Female 2	Age: _____	Ethnicity:_____
If the respondent and owner are different	Respondent's relation to the owner	Respondent's role in IWM ?	
Contact Telephone Number			
IWM ID Number			
How long have you been using IWM? (Verify with users' booklet)	……..months		
Type of IWM	Long Shaft 1 / Short Shaft 2	Installation Date / IWM Booklet Number	
Name of the installer company			

1. General Information about the IWM

1.1	**Is the IWM in operation?**	**Yes**	**1**	*If No 1.3*
		No	2	
1.2	What is the operational status of IWM?	Excellent	1	***Go to section 2***
		Good	2	
		Satisfactory	3	
		Poor	4	
1.3	What is the reason for IWM not in operation?	Technical Problem	1	***Go 1.4***
		Water is not sufficient	2	***Go 1.5***
		Other (specify)	3	
1.4	***In case of Technical Problems***			
1.4.1	What technical problems are you facing?			
1.4.2	Have you requested support from the service provider to solve the problem encountered?	Yes	1	***Go 1.4.3***
		No	2	***Go 1.4.4***
1.4.3	If yes, after how many days your IWM will be back in operation?			days
1.4.4	If No, do you intend to seek such support?	Yes	1	
		No	2	
1.4.4.1	If "No" for Q.N. 1.4.4, why don't you intend to ask for such support?	I shall fix the problem by myself	1	***End the survey***
		I shall ask someone else to fix this problem	1	
		I don't intend to operate the IWM again	1	
1.5	***In case of Water problems***			

1.5.1	If water is not sufficient, since how long have you not operated your IWM due to insufficiency in water?		
1.5.2	Do you face the problem of insufficient water every year?	Yes	1
		No	2
1.5.2.1	If Yes, how many days in a year do you have to halt the operation of your IWM?		days

2. Socio-economic Profile of IWM Owners

2.1	**How many people live in your household?**	**---- ---- (Number of person)**		
2.2	How many people in your HH are of school going age? (between 5 and 20)	Male _____	Female _____	
2.3	Household head	Male 1	Female 2	Age ___ ____
2.4	Do you have following facilities in your household?	**Facilities**	**Yes**	**No**
		Toilet	1	2
		Drinking water/Tap	1	2
		Telephone/Mobile	1	2
		Electricity (Grid)	1	2
		Radio/Television	1	2
2.5	What is your education level?	Illiterate		1
		Literate only		2
		Primary Level (1-5)		3
		Lower Secondary Level (6-8)		4
		Secondary Level (9-10)		5
		Higher Secondary Level (11-12)		6
		Above Higher Secondary Level (12>)		7
2.6	What is the ownership status of land used for IWM?	Private		1
		Rented		2
		Public		3
		Other (specify)		4
2.7	How did you come to know about improved water mills (IWM) program?	Local Service Center		1
		Local people/Relatives		2
		CRT/Nepal		3
		AEPC		4
		Newspaper/TV/Radio		5
		Other (Specify)		6
2.8	How many other IWM are there in your VDC?	Long Shaft		
		Short Shaft		
2.9	Who took the decision to install IWM in your family?	The head of household male member		1
		The head of household female member		2
		Your son/daughter		3
		Other (specify)		4
2.10	Do you have an additional sources of income apart from IWM?	Yes 1	No 2	Specify
2.11	Cost details for IWM installation	**Source**	**Amount NPR**	
		Self		

		Government Subsidy		
		Loan		
		Others (specify)		
		Total		
2.12	How did you manage your own investment?	Family saving	1	
		Remittance	2	
		Property selling	3	
		Loan Installment	4	
		Other (specify)	5	
2.13	Source of support for IWM operation (family support)	Wife	1	
		Husband	2	
		Son	3	
		Daughter	4	
		Wife/Daughter	5	
		Wife and Son	6	
		Father and Mother	7	
		All	8	
2.14	Whether profit has increased or decreased after the improvement?	Increased	1	***If decreased Go 2.14.1***
		Decreased	2	
		Same as before	3	
2.14.1	What are the possible reasons?			
2.15	How many households have been benefited from your IWM?		------	Total HHs
2.16	Please indicate what is the caste composition of the households that visit your IWM?	**S.N.**	**Caste**	**HHs Nos**
		1		
		2		
		3		
		4		
		5		
2.17	How much time taken by the farthest users to come in your IWM?			
2.18	How many costumers visit IWM daily?			
2.19	How is the general trends of daily visit in your IWM?	**Categories**		**Number**
		Adult Male		
		Adult Female		
		Female Children <16		
		Male Children < 16		
2.20	Do you encourage to others for the improvements?	Yes	1	
		No	2	
2.21	How many people are employed from your IWM?	-------		

3. Performance of IWM

3.1 IWM operation details

Crops	Average Processing time		Average days/year	Processing Capacity (Pathi/hr.)	Average Quantity Processed /Year	Processing Price/unit (NRs)	If there is food grain collection practice	
	Hours/Day	**Day/Month**					**If food grains (Unit/20pathi)**	**(Market price/Pathi) NRs**
Maize								
Wheat								
Millet								
Others								

3.2 End use operation details (This section is applicable only for long shaft)

Crops	Average Processing time		Average days/year	Processing Capacity (Pathi/hr.)	Average Quantity Processed /Year	Processing Price/unit (NRs)	If there is food grain collection practice
	Hours/Day	**Month/Year**					
Rice Hulling							
Rice beating							
Oil Expelling							
Saw Mill							
Lokta Beating							
Electricity							
Others							

3.3 Comparative performance of water mill before (traditional) and after (improvement)

Crops	Comparison	Average Pathi/ Hr.	Remarks
Maize	Before Improvement		
	After Improvement		
Wheat	Before Improvement		
	After Improvement		
Millet	Before Improvement		
	After Improvement		
Rice	Before Improvement		
	After Improvement		
Others	Before Improvement		
	After Improvement		

4. Operation and Maintenance Services of IWM

4.1	**What are the major associated problems in IWM? Please select the appropriate (Multiple Choice)**	**Takkar and Chakati**	**1**	
		Canal	2	
		Nozzle	3	
		Stone Cutting	4	
		Loss of flour	5	
		Mani/Madani	6	
		Bearing	7	
		Other (specify)	8	
4.2	Have you done repair and maintenance of the IWM after installation?	Yes	1	
		No	2	
4.3	Please mention the number of repair and maintenance per annum			
4.4	How is the frequency (number) of stone cutting made in a year?			
4.5	Are you satisfied with after sales services from service centers?	Highly Satisfied	1	
		Satisfied	2	
		Moderately Satisfied	3	
		Not satisfied	4	
4.6	How far the service center is located from your IWM location?			Minutes
4.7	What arrangements are made for the repair and maintenance?	On demand from the same company	1	
		Self	2	
		From other company	3	
		Local Technician	4	
		Other	5	
4.8	Does SC personnel visit at your IWM site after installation?	Yes	1	***If No skip 4.8.1***
		No	2	
4.8.1	If yes, how many times after installation ?			
4.9	Have you received any kind of training for repair and maintenance?	Yes	1	
		No	2	

5. IWM Owners' Overall Satisfaction

Indicators	Very High	High	Normal	Low
How would you rate the quality of technical services?				
After installation technical backstopping				
Frequency of maintenance requirement				
Availability of spare parts				
Technical difficulty				
Cost of maintenance				
Satisfaction with AEPC/NRREP services and performances				
Satisfaction with the installer company				
IWM brought happiness among the beneficiaries				
IWM is reasonable for the poor				
Accepted as better rural technology for agro-processing				
How would you rate the installation cost of IWM?				
Are you satisfied with the performance of your IWM?				

6. Key Observation

B. Questionnaire for IWM Users (Household Level)

Firm No. (For Official Use Only)	Interview date		Name of Enumerator	Survey Location
Form ID :	DD/MM/YY		ENUM	PLACE
Code of district	Code of Eco-belt		Code of Dev Region	VDC and Ward
Respondent's Name	Male	Female	Age: _____	Ethnicity:_____
	1	2		
Name of the IWM owner	Male	Female	Age: _____	Ethnicity:_____
	1	2		
Contact Telephone Number				

1. Household Characteristics

1.1	**How many people live in your household?**	**---- ---- (Number of person)**		
1.2	How many people in your HH are of school going age? (between 5 and 20)	Male _____	Female _____	
1.3	Household head	Male 1	Female 2	Age ___ ___
1.4	Do you have following facilities in your household?	**Facilities**	**Yes**	**No**
		Toilet	1	2
		Drinking water/Tap	1	2
		Telephone/Mobile	1	2
		Electricity (Grid)	1	2
		Radio/Television	1	2
1.5	What is your education level?	Illiterate		1
		Literate only		2
		Primary Level (1-5)		3
		Lower Secondary Level (6-8)		4
		Secondary Level (9-10)		5

		Higher Secondary Level (11-12)	6
		Above Higher Secondary Level (12>)	7
1.6	What is your main occupation?	Agriculture	1
		Business	2
		Labor Works	3
		Government Service	4
		Private	5
		Secretariat/Professional	6
		Other	7
1.7	How is the food sufficiency status in your household?	Up to 3 months	1
		3 to 6 months	2
		6 to 12 months	3
		Surplus	4
1.8	Could you provide the average annual income and expenses of your household?	Average Annual Income (a)	
		Average Annual Expenses (b)	
		Annual saving or loss (a-b)	
1.9	Land Holding (Ropani)		

2. Agro-processing Activity and Benefits of IWM

2.1 Agriculture Production

S.N.	Crop	Unit	Production Quantity/ year	Quantity		Price	
				Buy	**Sale**	**Buy**	**Sale**
1	Rice						
2	Wheat						
3	Maize						
4	Millet						
5	Barley						
6	Mustard						
7	Other						

2.2	**Before the IWM was installed in your locality, where did you mostly go for agro-processing?**	**Home based agro processing**	**1**
		Traditional Water Mill	2
		Diesel Mill	3
2.2.1	Why have you preferred IWM?	1. 2. 3.	
2.3	Have you felt any reduction in drudgery after you started using IWM?	Yes	1
		No	2
2.4	Which type of IWM do you have mostly used?	Long Shaft	1
		Short Shaft	2
2.5	Is the existing IWM sufficient for performing agro processing of the community?	Yes	1
		No	2
2.6	How has the agricultural productivity changed after IWM installation in your community?	Increased	1
		Decreased	2
		Same	3

2.7	What is the distance from your house to the IWM?	……KM			
2.8	How much time do you need to travel to the IWM area and come back to your home?	……Hr.			
2.9	Who mostly visits the IWM for agro-processing?	***Persons***	***Frequency/month***		***Average Qty (Pathi per visit)***
			Before	***After***	
		Adult female			
		Adult male			
		Children female			
		Children male			
	Have you felt any reduction in drudgery of women and children after you started using IWM?	Yes	1		
		No	2		
2.10	Is time required for the agro-processing is reduced after improvement of water mill?	Yes	1		
		No	2		
2.10.1	If yes how much time is saved per visit?	**Persons**	**Minutes**		
			Before	After	Saving
		Adult female			
		Adult male			
		Children female			
		Children male			
2.11	Utilization of saved time of family members (Multiple Response)	Agricultural works	1		
		Household activities	2		
		Income Generating Activities	3		
		Social Work	4		
		Study	5		
		Doing nothing	6		
		Others	7		
2.12	What are the major benefits from IWM technology in your surrounding places?	1. 2.	3. 4.		
2.13	Tariff structure of agro-processing per unit as compared with other technology	Expensive	1		NPR
		Same	2		
		Cheaper	3		
2.14	End-use preferred from IWM (if any)	1. 2. 3. 4. 5.			

3. Users' perception towards IWM technology

3.1	**How is the quality of end-products from IWM?**	**Excellent**	**1**
		Good	2
		Satisfactory	3
		Poor	4
3.2	Is IWM helping for Income Generation Activities?	Yes	1
		No	2

3.2.1	If Yes, what are the reasons?	Adequate Resources	1
		Saving of time	2
		Livelihood promotion training	3
		Low processing cost	4
		Other	5
3.3	Overall satisfaction from IWM technology	Excellent	1
		Good	2
		Satisfactory	3
		Poor	4
3.4	If not satisfied, what are the reasons?	1. 2. 3.	
3.5	Are you Satisfied with the IWM owner?	Yes	1
		No	2
	If yes, what is your satisfaction level with the Owner of IWM	Excellent	1
		Good	2
		Satisfactory	3
		Poor	4
3.6	How do you find the behavior of the Owner and IWM operatives ?	Excellent	1
		Good	2
		Satisfactory	3
		Poor	4
3.7	How do you feel about the tariff rates charged in the IWM processing?	Reasonable	1
		Fair	2
		Not reasonable	3
		Too High	4
3.8	Does the IWM Owner Provide timely service ?	Yes	1
		No	2
3.9	If not, how long do you have to wait for your turn in processing?	…….min	
3.10	Is the Owner biased?	Yes	1
		No	2
3.11	Have you ever felt the need of going to other nearest IWM because of some reasons? Mention reasons as well		
3.12	Have you felt any correction required to be made in the quality of agro-processing from IWM?	Yes	1
		No	2
3.13	If yes, what type of changes or modifications required?	1. 2. 3.	
3.14	Do you encourage other people for IWM agro-processing?	Yes	1
		No	2
3.15	If no, what are the reasons?	1. 2. 3.	
3.16	Do you have any suggestions to improve the overall performance of IWM?	1. 2. 3.	

Key Note:

Annex-2: Surveyed List of IWM

S. N.	Name of IWM Owner	Address	Ward No.	Village	VDC Name	District Name	IWM Type
1	Dhan Kumar Rai	Piping	3	Piping	Phedi	Khotang	Short Shaft
2	Hasta Ram Rai	Makhamla	3	Makhamla	Phedi	Khotang	Short Shaft
3	Shanti Raj Rai	Moli	9	Chhumlung	Moli	Okhaldhunga	Short Shaft
4	Hasta Bahadur Magar	Betini	7	Kartike	Betini	Okhaldhunga	Long Shaft
5	Bishnu Lal Giri	Katunje	7	Karaghari	Katunje	Okhaldhunga	Long Shaft
6	Gopal Magar	Betini	7	Rupse	Betini	Okhaldhunga	Long Shaft
7	Dirki Bishwokarma	Jantarkhani	1	Khursani Bari	Jantarkhani	Okhaldhunga	Short Shaft
8	Raj Kumar Tamang	Thaprek	1	Majuwa	Thaprek	Nuwakot	Short Shaft
9	Tej Bahadur Tamang	Thaprek	5	Birta	Thaprek	Nuwakot	Short Shaft
10	Buddhi Bahadur Lama	Thaprek	2	Lama	Thaprek	Nuwakot	Short Shaft
11	Manjit Tamang	Betini	1	Tapsang	Betini	Nuwakot	Short Shaft
12	Hiralama Tamang	Betini	7	Jimjang	Betini	Nuwakot	Short Shaft
13	Sanja Tamang	Kharanitar	8	Koiralchet	Kharanitar	Nuwakot	Long Shaft
14	Damber Bdr Lama	Betini	7	Tapsang	Betini	Nuwakot	Short Shaft
15	Sukuman Tamang	Thaprek	2	Mane	Thaprek	Nuwakot	Short Shaft
16	Dinesh Tamang	Betini	4	Dharapani	Betini	Nuwakot	Short Shaft
17	Dupsang Tamang	Betini	8	Setilung	Betini	Nuwakot	Short Shaft
18	Shreeman Tamang	Betini	7	Huimang	Betini	Nuwakot	Short Shaft
19	Sanman Tamang	Betini	7	Tapsang	Betini	Nuwakot	Short Shaft
20	Seti Tamang	Betini	3	Bimrang	Betini	Nuwakot	Short Shaft
21	Arjun Tamang	Betini	1	Danda	Betini	Nuwakot	Short Shaft
22	Jiti holder Tamang	Betini	1	Waru	Betini	Nuwakot	Short Shaft
23	Syrpa Tamang	Rautbesi	1	Masam	Rautbesi	Nuwakot	Short Shaft
24	Milnsing Tamang	Betini	1	Danda	Betini	Nuwakot	Short Shaft
25	Fulsani Tamang	Betini	5	Golpu	Betini	Nuwakot	Short Shaft
26	Sirsani Tamang	Betini	3	Bimmaryang	Betini	Nuwakot	Short Shaft
27	Indra Bahadur Tamang	Betini	7	Tapsangpairo	Betini	Nuwakot	Short Shaft
28	Aitalal Sarki	Ghandruk	1	Kimche	Ghandruk	Kaski	Short Shaft
29	Dilliram Sharma Paudel	Ghandruk	1	Kliew	Ghandruk	Kaski	Short Shaft
30	Durga Bahadur Sarki	Ghandruk	1	Lotthok	Ghandruk	Kaski	Short Shaft
31	Dammar Bahadur Gharti	Ghandruk	1	Tikhyan	Ghandruk	Kaski	Short Shaft
32	Man Singh Oli	Khalanga	6	Darneta	Jajarkot Khalanga	Jajarkot	Short Shaft

33	Tulsi Ram Khadka	Khalanga	6	Rote	Jajarkot Khalanga	Jajarkot	Short Shaft
34	Pumphi Rana	Karkigaun	8	Majhagaun	Karkigaun	Jajarkot	Short Shaft
35	Mainasara Gosai	Karkigaun	5	Simali	Karkigaun	Jajarkot	Short Shaft
36	Bir Bahadur Magar	Jhapra	5	Khaltakura	Jhapra	Jajarkot	Short Shaft
37	Lachhae Khattari	Karkigaun	3	Palewat	Karkigaun	Jajarkot	Short Shaft
38	Narendra Bahadur Khattari	Karkigaun	3	Palewat	Karkigaun	Jajarkot	Short Shaft
39	Sharki Khattari	Karkigaun	3	Palewat	Karkigaun	Jajarkot	Short Shaft
40	Bir Singh Budha Magar	Jhapra	5	Khaltakura	Jhapra	Jajarkot	Short Shaft
41	Tulasi Khattari	Karkigaun,	3	Palewat	Karkigaun	Jajarkot	Short Shaft
42	Kharke Kami	Khalanga	5	Timile	Khalanga	Jajarkot	Short Shaft
43	Manbir Pun Magar	Jhapra	5	Khaltakura	Jhapra	Jajarkot	Short Shaft
44	Hirke Budha Magar	Jhapra	5	Khaltakura	Jhapra	Jajarkot	Short Shaft
45	Santa Bdr. Khattari	Karkigaun	3	Palewat	Karkigaun	Jajarkot	Short Shaft
46	Top Bahadur Kunwar	Kubhindedaha	5	Patigaira	Kubhindedaha	Salyan	Short Shaft
47	Ganesh Bdr. Dangi	Majhkada	9	Dhorpipal	Majhkada	Salyan	Short Shaft
48	Nakche Pun	Majhkada	9	Ukheta	Majhkada	Salyan	Short Shaft
49	Kharka Bdr. Gharti	Dharijpipal	7	Darimchaur	Dharijpipal	Salyan	Short Shaft
50	Gopi Ram Roka	Chandekareni	8	Majhkharka	Chandekareni	Salyan	Short Shaft
51	Bimi Budhamagar	Majhkada	9	Ukheta	Majhkada	Salyan	Short Shaft
52	Karana Bir Budhamagar	Majhkada	9	Baluwasangrahi	Majhkada	Salyan	Short Shaft
53	Tulasa Shah	Majhkada	7	Raikar	Majhkada	Salyan	Short Shaft
54	Bhime Pun	Kubhindedaha	5	Andheri	Kubhindedaha	Salyan	Long Shaft
55	Aamraj Damai	Majhkada	9	Barhale	Majhkada	Salyan	Short Shaft
56	Bir Bahadur Kuwar	Kubendedaha	3	Kubindedaha	Kubendedaha	Salyan	Short Shaft
57	Asbir B.K.	Majhkada	7	Sim	Majhkada	Salyan	Short Shaft
58	Chure Basnet	Kubhindedaha	7	Sowarajuilla	Kubhindedaha	Salyan	Short Shaft
59	Budda Jung Shaha	Majhkada	7	Raikar	Majhkada	Salyan	Short Shaft
60	Neb Bahadur Shah	Majhkada	9	Gara	Majhkada	Salyan	Short Shaft
61	Thakur Thapa Magar	Majhkada			Majhakada	Salyan	Short Shaft
62	Karn Bahadur Bist	Rauleswar	9	Bandipur	Rauleswar	Baitadi	Short Shaft
63	Krishna Bdr. Bist	Rauleshwor	4	Bistpali	Rauleshwor	Baitadi	Short Shaft
64	Karbir Bist	Rauleswar	4	Chakmola	Rauleswar	Baitadi	Short Shaft
65	Dipendra Bdr. Madai	Rauleswar	8	Harichan	Rauleswar	Baitadi	Short Shaft
66	Ratan Madai	Rauleswar	8	Harichan	Rauleswar	Baitadi	Short Shaft

67	Krishna B.Madai	Rauleswar	8	Harichan	Rauleswar	Baitadi	Short Shaft
68	Karn Madai	Rauleswar	8	Harichan	Rauleswar	Baitadi	Short Shaft
69	Dabbal Sing Madai	Rauleswar	8	Harichan seskharka	Rauleswar	Baitadi	Short Shaft
70	Dipendra Bahadur Madai	Rauleswar	8	Harichangad	Rauleswar	Baitadi	Short Shaft
71	Jaya Bahadur Bist	Rauleswar	9	Kagshyali	Rauleswar	Baitadi	Short Shaft
72	Ram Bahadur Bist	Rauleswar	9	Karikot	Rauleswar	Baitadi	Short Shaft
73	Hare Datt Awasti	Sankarpur	7	Khakodhar	Sankarpur	Baitadi	Short Shaft
74	Jagadish Kuwar	Sankarpur	2	Riga	Sankarpur	Baitadi	Short Shaft
75	Ganesh Bahadur Kuwar	Sankarpur	2	Riga	Sankarpur	Baitadi	Short Shaft
76	Gobind Prasad Awasti	Bijayapur	2	Sandi	Bijayapur	Baitadi	Short Shaft
77	Sankar Bahadur Bist	Bijayapur	1		Bijayapur	Baitadi	Short Shaft
78	Dhan Bahadur Bist	Bijayapur	2	Sandi	Bijayapur	Baitadi	Short Shaft
79	Bire Luhar	Bijayapur	2	Sandi	Bijayapur	Baitadi	Short Shaft
80	Ramesh Sarki	Bijayapur	2	Sandi	Bijayapur	Baitadi	Short Shaft
81	Indra Bahadur Bist	Bijayapur	2	Sandi	Bijayapur	Baitadi	Short Shaft
82	Bishnu Datta Bist	Gwani	2	Kidipatala	Gwani	Darchula	Short Shaft
83	Naine Kami	Gokuleshwor	2	Tatapani	Gokuleshwor	Darchula	Short Shaft
84	Haridev Singh Dhami	Gwani	5	Gwani	Gwani	Darchula	Short Shaft
85	Rajendra Singh Dhami	Gwani	5	Sonpanayar	Gwani	Darchula	Short Shaft
86	Dhirka Bdr Singh Dhami	Gwani	4	Thulgada	Gwani	Darchula	Short Shaft
87	Chandra Singh Dhami	Gwani	5	Turna	Gwani	Darchula	Short Shaft
88	Bahadur Singh Dhami	Gwani	1	Milmili	Gwani	Darchula	Short Shaft
89	Dan Singh Dhami	Gwani	2	Milmili	Gwani	Darchula	Short Shaft
90	Shankar Singh Saund	Gokuleshwor	2	Kumali	Gokuleshwor	Darchula	Short Shaft
91	Hari Bahadur Saund	Gokuleshwor	2	Kumali	Gokuleshwor	Darchula	Short Shaft
92	Ganesh Sing Dhami	Gwani	5	tunda	Gwani	Darchula	Short Shaft
93	Jaya Kami	Gokuleshwor	2	Gokuleshwor	Gokuleshwor	Darchula	Short Shaft

Annex-3: Photographs

Photo 1: Field surveyor with IWM owner in Nuwakot district

Photo 2:Field surveyor observed repair and maintenance works

Photo 3: Happy women user of IWM

Photo 4: Children collecting flour in Darchula district

Photo 5: IWM user waiting for her grind flour

Photo 6:Women involved in flour collection

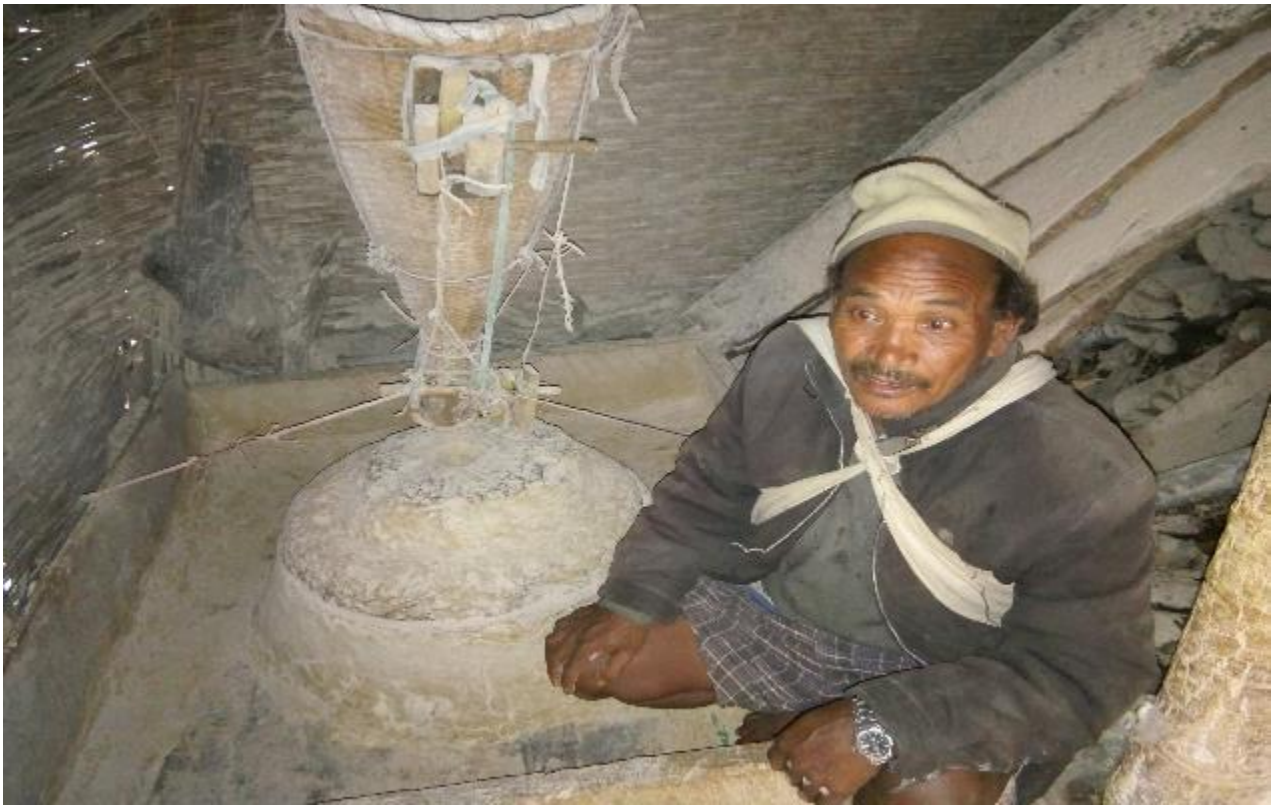


Photo 7: Happy IWM owner in Kaski district

Photo 8: IWM Long Shaft observed in Okhaldhunga district

Photo 9: IWM Pretesting Visit of Team leader and Enumerators